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AN-08-10-233

HANDBOOK OF OPERATING INSTRUCTIONS FOR AN/ARW-2, AN/ARW-2X RECEIVING EQUIPMENT AND AN/ARW-3 TRANSMITTING EQUIPMENT

●

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11 JANUARY 1944

Published under joint authority of the United States War and Navy Departments and the Air Council of the United Kingdom.

UNSATISFACTORY REPORT

FOR U. S. ARMY AIR FORCE PERSONNEL:

In the event of malfunctioning, unsatisfactory design, or unsatisfactory installation of any of the component units of this equipment, or if the material contained in this book is considered inadequate or erroneous, an Unsatisfactory Report, AAF Form No. 54, or a report in similar form, shall be submitted in accordance with the provisions of Army Air Force Regulations No. 15-54, listing:

1. Station and organization.
2. Nameplate data (type number or complete nomenclature if nameplate is not attached to the equipment).
3. Date and nature of failure.
4. Airplane model and serial number.
5. Remedy used or proposed to prevent recurrence.
6. Handbook errors or inadequacies, if applicable.

FOR U. S. NAVY PERSONNEL:

Report of failure of any part of this equipment during its guaranteed life shall be made on Form N. Aer. 4112, 'Report of Unsatisfactory or Defective Material,' or a report in similar form, and forwarded in accordance with the latest instructions of the Bureau of Aeronautics. In addition to other distribution required, one copy shall be furnished to the Resident Inspector of Naval Material, Link Radio Corp., 125 W. 17 St., New York 11, New York, and the Bureau of Ships. Such reports of failure shall include:

1. Reporting activity.
2. Nameplate data.
3. Date placed in service.
4. Part which failed.
5. Nature and cause of failure.
6. Replacement needed (yes-no).
7. Remedy used or proposed to prevent recurrence.

FOR BRITISH PERSONNEL:

Form 1022 procedure shall be used when reporting failure of radio equipment.

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WARNING

OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES WHICH ARE DANGEROUS TO LIFE. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE ALL SAFETY REGULATIONS. DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE THE EQUIPMENT WITH HIGH VOLTAGE SUPPLY ON. UNDER CERTAIN CONDITIONS DANGEROUS POTENTIALS MAY EXIST IN CIRCUITS WITH POWER CONTROLS IN THE OFF-POSITION DUE TO CHARGES RETAINED BY CAPACITORS, ETC. TO AVOID CASUALTIES ALWAYS DISCHARGE AND GROUND CIRCUITS PRIOR TO TOUCHING THEM.

THE ATTENTION OF OFFICERS AND OPERATING PERSONNEL IS DIRECTED TO BUREAU OF ENGINEERING CIRCULAR LETTER No. 5a OF 3 OCTOBER, 1934, OR SUBSEQUENT REVISIONS THEREOF ON THE SUBJECT OF "RADIO—SAFETY PRECAUTIONS TO BE OBSERVED."

MEDICAL DEPARTMENT
UNITED STATES NAVY

ELECTRIC SHOCK
FIRST-AID TREATMENT

(DIVISION OF PREVENTIVE MEDICINE)
1942

SAFETY FIRST Regard electrical apparatus generally, and especially all current-carrying parts, as dangerous, irrespective of voltage. Exercise great care in handling, and avoid broad contacts such as are made by standing on a metal deck or in water.

Dangerous contact may result through lessened resistance when the skin and clothing are wet with perspiration. Contact with damp metal surfaces—decks, bulkheads, guns, machinery—may allow the current to ground through the moist skin and body.

Electric shock is due to current passing through the body—current actually passing—irrespective of the voltage. A pressure as low as 110 volts has caused death. Current passing through the body in the region of the heart is especially dangerous. In using electric breast drills avoid the possibility of a ground.

Usually electric shock does not kill instantly. Life can often be saved even though breathing has stopped.

I. FREE THE VICTIM FROM THE CIRCUIT IMMEDIATELY.

Use a dry nonconductor (rubber gloves, clothing, rope, board) to move either the victim or the wire. Beware of using metal or moist material.

Shut off the current.

If necessary to cut a live wire, use an ax or hatchet with a dry wooden handle; turn your face away from the electrical flash.

II. ATTEND INSTANTLY TO THE VICTIM'S BREATHING.

Begin resuscitation at once on the spot. Do not stop to loosen clothing; every moment counts.

RESUSCITATION BY THE PRONE PRESSURE METHOD OF ARTIFICIAL RESPIRATION

GAS ASPHYXIATION ELECTRIC SHOCK DROWNING

Waste no time. When the patient is removed from the water, gas, smoke, or electric contact, get to work at once with your own hands. Send for the medical officer or nearest physician.

No reliance should be placed upon any special mechanical apparatus, as it is frequently out of order and often is not available when most needed. The patient's mouth should be cleared of any obstruction such as chewing gum or tobacco, false teeth, or mucus, so that there is no interference with the entrance and escape of air.

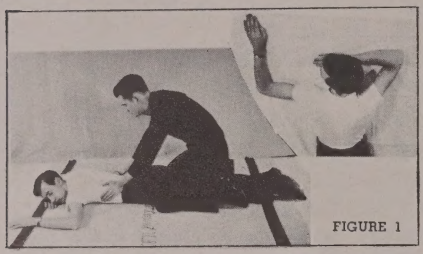


FIGURE 1

POSITION

1. Lay the patient on his belly, one arm extended directly overhead, the other arm bent at elbow and with the face turned outward and resting on hand or forearm, so that the nose and mouth are free for breathing. (See Inset, fig. 1.)

2. Kneel straddling the patient's thighs with your knees placed at such a distance from the hip bones as will allow you to assume the position shown in Figure 1.

Place the palms of the hands on the small of the back with fingers resting on the ribs, the little finger just touching the lowest rib, with the thumb and fingers in a natural position, and the tips of the fingers just out of sight. (See fig. 1.)

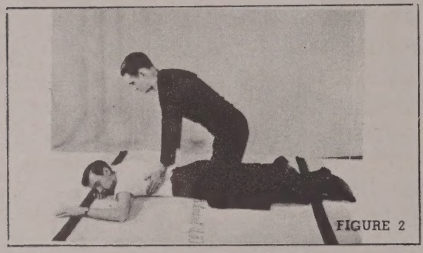


FIGURE 2

FIRST MOVEMENT

3. With arms held straight, swing forward slowly, so that the weight of your body is gradually brought to bear upon the patient. The shoulder should be directly over the heel of the hand at the end of the forward swing. (See fig. 2.) Do not bend your elbows. This operation should take about two seconds.

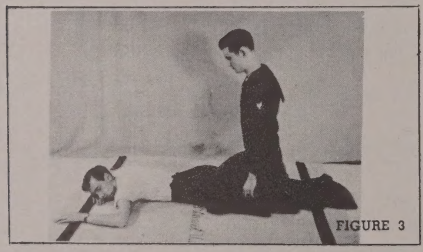


FIGURE 3

SECOND MOVEMENT

4. Now immediately swing backward, so as to remove the pressure completely. (See fig. 3.)

5. After two seconds, swing forward again. Thus repeat deliberately twelve to fifteen times a minute the double movement of compression and release, a complete respiration in four or five seconds.

6. Continue artificial respiration without interruption until natural breathing is restored. Do not get discouraged at the slow results that sometimes happen when resuscitating the apparently drowned. Efforts often have to be continued a long time before signs of life are apparent. Do not discontinue the efforts until certain that all chance is lost. Sometimes, even after several hours' work, recovery takes place.

7. As soon as this artificial respiration has been started and while it is being continued, an assistant should loosen any tight clothing about the patient's neck, chest, or waist. TO KEEP THE PATIENT WARM DURING ARTIFICIAL RESPIRATION IS MOST IMPORTANT AND IT MAY BE NECESSARY TO COVER HIM WITH BLANKETS AND WORK THROUGH THEM, AS WELL AS TO APPLY HOT-WATER BOTTLES, HOT BRICKS, ETC. Do not give any liquids whatever by mouth until the patient is fully conscious.

8. To avoid strain on the heart when the patient revives, he should be kept lying down and not allowed to stand or sit up. If the doctor has not arrived by the time the patient has revived, he should be given some stimulant, such as one teaspoonful of aromatic spirits of ammonia in a small glass of water or a hot drink of coffee or tea, etc. Continue to keep the patient warm and at rest.

9. Resuscitation should be carried on at the nearest possible point to where the patient received his injuries. As a general rule he should not be moved from this point until he is breathing normally of his own volition and then moved only in a lying position. Should it be necessary, due to extreme weather conditions, etc., to move the patient before he is breathing normally, resuscitation should be carried on during the time that he is being moved.

10. A brief return of natural respiration is not a certain indication for stopping the resuscitation. Not infrequently the patient, after a temporary recovery of respiration, stops breathing again. The patient must be watched, and if natural breathing stops, artificial respiration should be resumed at once.

11. In carrying out resuscitation it may be necessary to change the operator. This change must be made without losing the rhythm of respiration. The relief operator should kneel behind the one giving the artificial respiration and at the end of the movement, the operator crawls forward while the relief takes his place. By this procedure no confusion results at the time of change of operator, and a regular rhythm is kept up.

PRACTICE IN THE PERFORMANCE OF ARTIFICIAL RESPIRATION ON A VOLUNTEER SUBJECT SHOULD BE OBTAINED BY EVERYONE.

WOUNDS

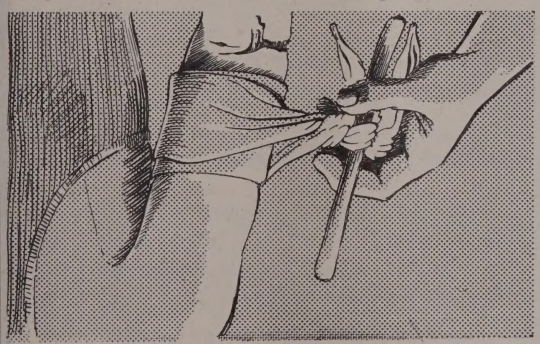
Neglected wounds can have serious consequences. Any break in the skin is a wound. Paint small cuts and scratches immediately with TINCTURE OF IODINE. Deep cuts and wounds should be KEPT CLEAN but DO NOT use Tincture of Iodine on them. Washing AROUND and AWAY FROM the wound with ordinary soap and water, if no other antiseptic is available, is recommended. Other antiseptics for use on deep wounds are: Violet gentian, Potassium permanganate, Tincture of Merthiolate, or ordinary baking soda and water. Cover the wound with a sterile gauze dressing and hold in place with adhesive tape or a strip of gauze.

In cases of serious bleeding, when an artery has been cut, firm pressure is necessary to stop the flow of blood. Arterial bleeding is BRIGHT RED and comes from the wound in SPURTS, with each beat of the heart. Bleeding from a vein is DARK RED and flows steadily. Pressure is not often needed for venous bleeding.

Pressure is applied ABOVE the wound, or between the WOUND AND THE HEART, to stop ARTERIAL BLEEDING. Pressure is applied BELOW the wound, or AWAY FROM THE HEART to stop VENOUS BLEEDING.

Pressure is best applied and maintained by means of a TOURNIQUET.

A TOURNIQUET is a strip of cloth, bandage, or other material, tied ABOVE the wound. Tie a simple, double knot in the cloth and place a strong



Tourniquet in position ABOVE wound.

stick or other rigid member in the loop thus made, then tighten the knot by pulling the ends of the cloth.

With the rigid member thus held firmly in place, twist it until the bleeding stops.

DO NOT maintain such pressure longer than 15 minutes at a time.

IF BLEEDING CONTINUES after loosening tourniquet, allow the blood to flow for about 30 to 60 seconds and then re-apply pressure. Continue until bleeding stops.

AFTER BLEEDING HAS STOPPED, the wound should be carefully covered with a sterile dressing. DO NOT TOUCH WOUND OR DRESSING WITH DIRTY HANDS!

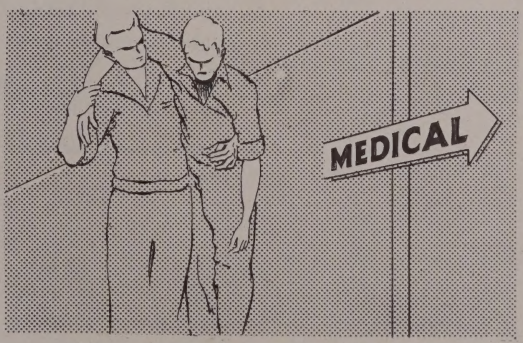
Keep the victim LYING FLAT ON HIS BACK, AND WELL COVERED. DO NOT LET HIM SEE HIS WOUND. Divert his thoughts from himself.

Obtain the services of a DOCTOR AS SOON AS POSSIBLE.

BURNS

Burns, whether caused by contact with high voltage electrical equipment, fire, or friction, require immediate attention.

1. Apply AT ONCE any one of the following:
   a. Tannic acid jelly.
   b. Butesin picrate.
   c. Paste made with baking soda and water.
   d. Very strong, cool tea.
2. Applications should be LIBERAL and the burned area covered with STERILE GAUZE.
3. If clothing sticks to the burned area, DO NOT ATTEMPT TO REMOVE IT. Treat burn as above.
4. Keep the victim WELL COVERED and LYING FLAT ON HIS BACK. Soothe and reassure him.
5. Obtain the services of a DOCTOR AS SOON AS POSSIBLE.



Always obtain the services of a doctor as quickly as possible.

DESTRUCTION OF ABANDONED MATERIEL IN THE COMBAT ZONE

In case it should become necessary to prevent the capture of this equipment and when ordered to do so, DESTROY IT SO THAT NO PART OF IT CAN BE SALVAGED, RECOGNIZED OR USED BY THE ENEMY. BURN ALL PAPERS AND BOOKS.

Means:

1. Explosives, when provided.
2. Hammers, axes, sledges or whatever heavy objects are readily available.
3. Burning by means of incendiaries such as gasoline, oil, paper or wood.
4. Grenades and shots from available arms.
5. Where possible, and when time permits, bury all debris or dispose of it in streams or other bodies of water.

Procedure:

1. Obliterate all identifying marks. Destroy nameplates and circuit labels.
2. Demolish all panels, castings, switch- and instrument-boards.
3. Destroy all controls, switches, relays, connections and meters.
4. Rip out all wiring in electrical equipment. Smash gas, oil and water cooling systems in gas-engine generators, etc.
5. Smash every electrical or mechanical part whether rotating, moving or fixed.
6. Break up all operating instruments such as keys, phones, microphones, etc.
7. Destroy all classes of carrying cases, straps, containers, etc.

Standard Navy "One Year Service" Radio Guarantee.

The equipment, including all parts and spare parts, except vacuum tubes, batteries, rubber and material normally consumed in operation, is guaranteed for a period of one year from the date of delivery of the equipment to and acceptance by the Government with the understanding that all such items found to be defective as to material, workmanship or manufacture will be repaired or replaced, f.o.b. any point within the continental limits of the United States designated by the Government, without delay and at no expense to the Government; provided that such guarantee will not obligate the contractor to make repair or replacement of any such defective items unless the defect appears within the aforementioned period and the contractor is notified thereof in writing within a reasonable time and the defect is not the result of normal expected shelf life deterioration.

To the extent the equipment, including all parts and spare parts, as defined above, is of the contractor's design or is of a design selected by the contractor, it is also guaranteed, subject to the foregoing conditions, against defects in design with the understanding that if ten per cent (10%) or more of any such said item, but not less than two of any such item, of the total quantity comprising such item furnished under the contract, are found to be defective as to design, such item will be conclusively presumed to be of defective design and subject to one hundred per cent (100%) correction or replacement by a suitably redesigned item.

All such defective items will be subject to ultimate return to the contractor. In view of the fact that normal activities of the Naval Service may result in the use of equipment in such remote portions of the world or under such conditions as to preclude the return of the defective items for repair or replacement without jeopardizing the integrity of Naval communications, the exigencies of the Service, therefore, may necessitate expeditious repair of such items in order to prevent interruption of communications. In such cases the return of the defective items for examination by the contractor prior to repair or replacement will not be mandatory. The report of a responsible authority, including details of the conditions surrounding the failure, will be acceptable as a basis for affecting expeditious adjustment under the provisions of this contractual guarantee.

The above one year period will not include any portion of time the equipment fails to perform satisfactorily due to any such defects, and any items repaired or replaced by the contractor will be guaranteed anew under this provision.

G-4-B

March, 1943 Revision

SECTION I
GENERAL DESCRIPTION

1. GENERAL.

The purpose of this hand book is to give installation information, describe the adjustments necessary upon installation, and to outline the operation of Receiving Equipments AN/ARW-2 and AN/ARW-2X as well as Transmitting Equipment AN/ARW-3. Emergency repairs of the above equipments are also described.

Receiving Equipments AN/ARW-2 and AN/ARW-2X are identical except for the required primary power source. AN/ARW-2 requires a source of direct current at 23-29 volts while AN/ARW-2X requires a source of direct current at 11.5—14.5 volts. The Transmitting Equipment AN/ARW-3 requires a source of 23-29 volts direct current. If the Amplifier Unit AM-10/ARW-3 is used, an additional source of power at 115 volts, 800-2400 cycles alternating current is required.

2. MAJOR UNITS.

The major units forming complete equipments are tabulated below with their maximum overall dimensions and weights.

Qty.	Name of Unit	Overall Dimensions	Wgt. lbs.	Numerical Series of Reference Symbols
	(For Receiving Equipment AN/ARW-2)			
1	Radio Receiver R-32/ARW-2	22⅜" x 10-7/16" x 9-3/16"	48.6	101-199
1	Mounting Base *MT-52/UR	22" x 10-7/16" x 2-3/16"	3.9	
	Associated Cables			
	(For Receiving Equipment AN/ARW-2X)			
1	Radio Receiver R-33/ARW-2X	22⅜" x 10-7/16" x 9-3/16"	48.6	101-199
1	Mounting Base *MT-52/UR	22" x 10-7/16" x 2-3/16"	3.9	
	Associated Cables			
	(For Transmitting Equipment AN/ARW-3)			
1	Radio Transmitter T-24/ARW-3	22⅜" x 10-7/16" x 9-3/16"	34.6	201-399
1	Mounting Base *MT-52/UR	22" x 10-7/16" x 2-3/16"	3.9	
1	Amplifier Unit AM-10/ARW-3	22⅜" x 15-7/16" x 12¼"	65.5†	401-499
1	Mounting Base *MT-53/UR	22⅜" x 15-7/16" x 2-3/16"	4.1	
	Associated Cables			

NOTE: Weight of Major Units includes mounting base and plugs.
† Serial Nos. 1-50—81.5 lbs.

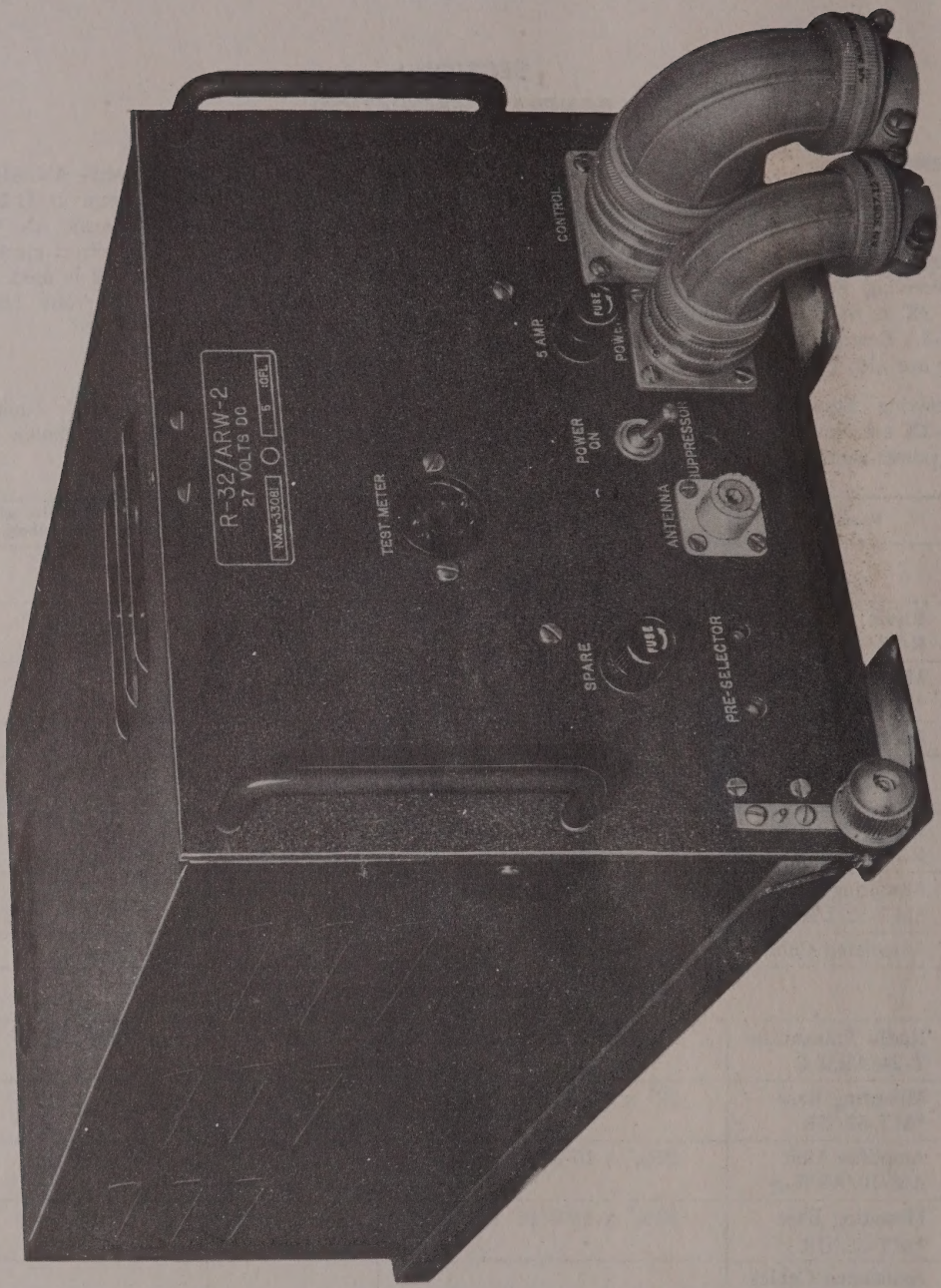


Figure 1 — Radio Receiver R-32/ARW-2 or Radio Receiver R-33/ARW-2X

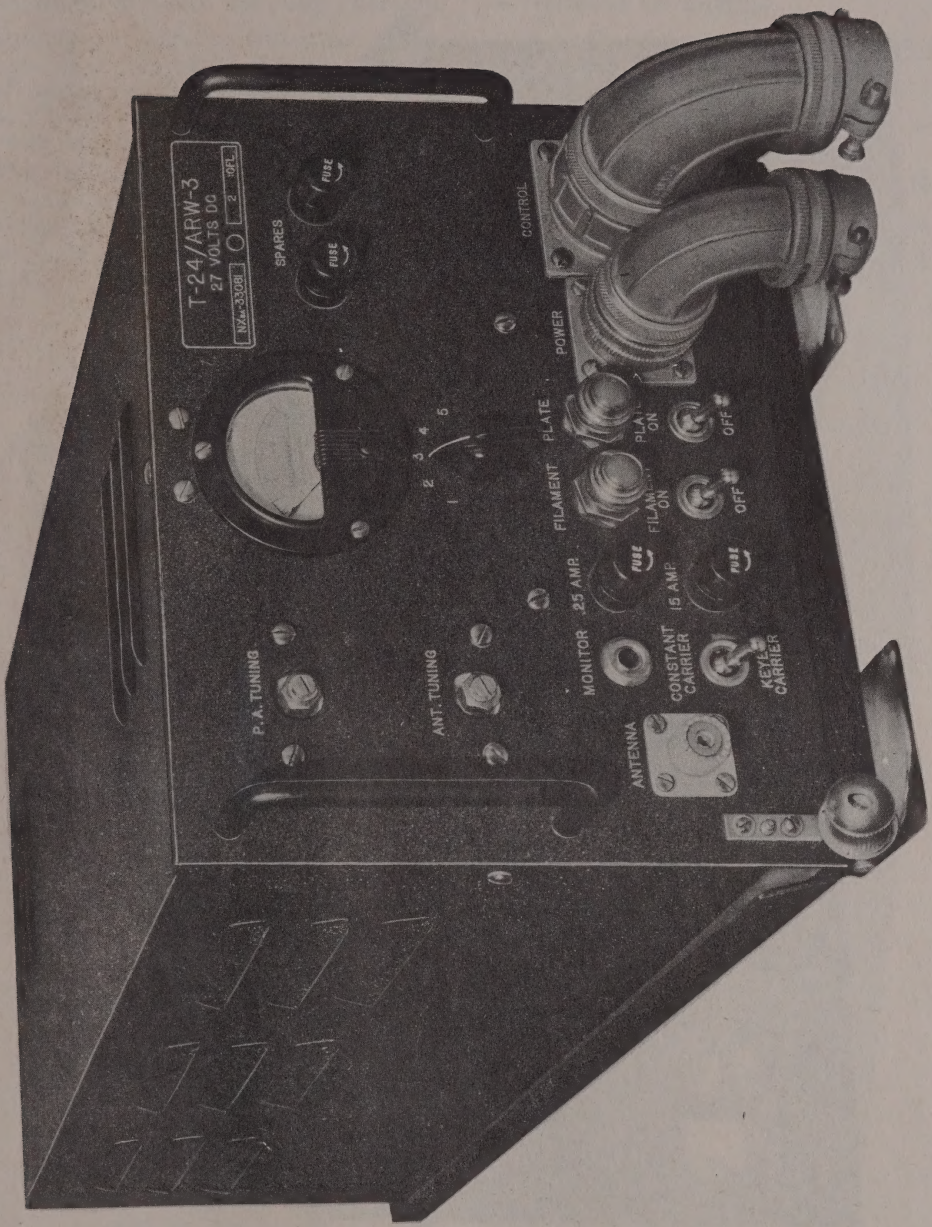


Figure 2—Radio Transmitter T-24/ARW-3

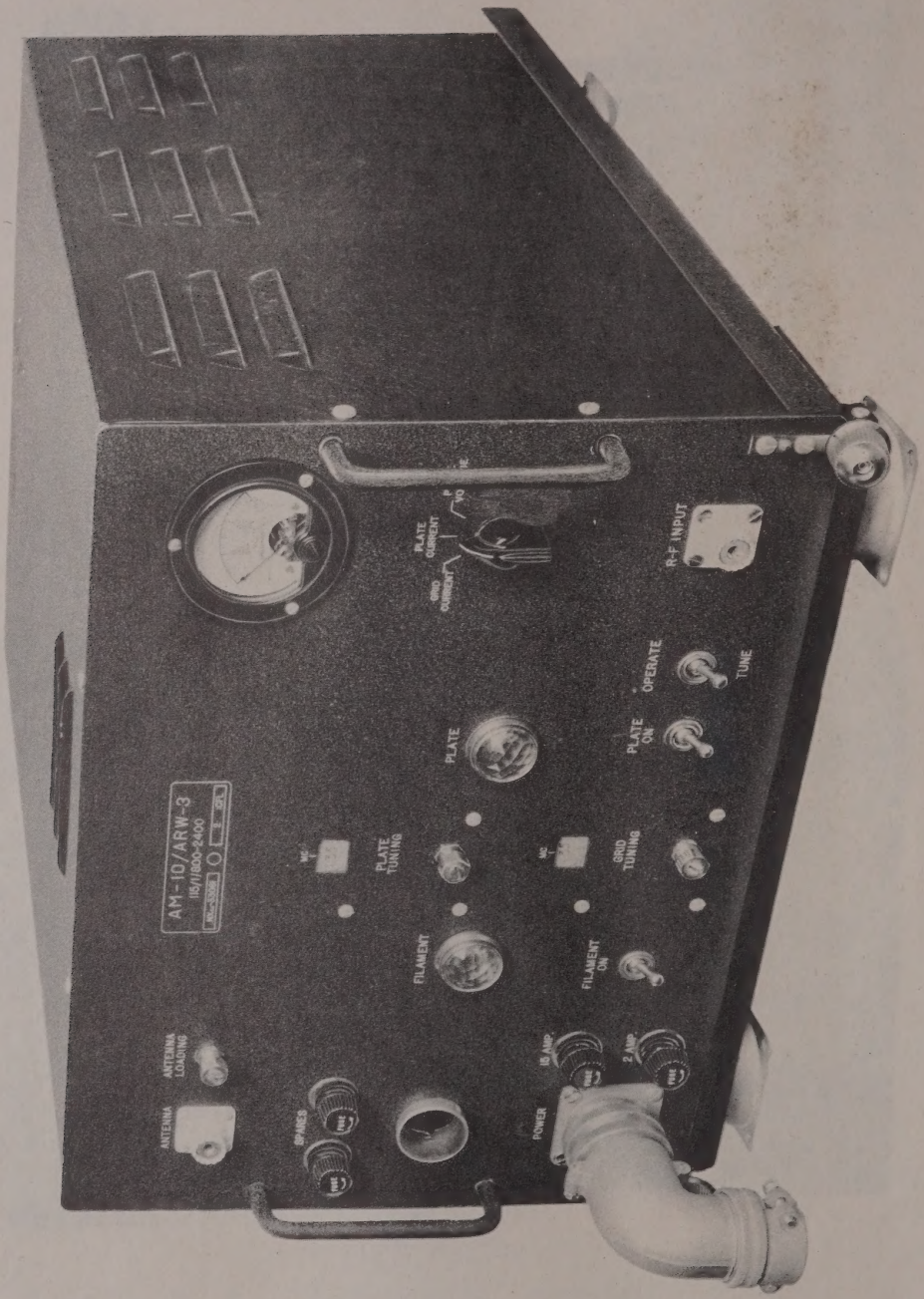


Figure 3 — Amplifier Unit AM-10/ARW-3

3. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

Primary power of 11.5-14.5 volts direct current, 23-29 volts direct current, or 115 volts 800-2400 cycle alternating current is required as outlined in paragraph 1. In addition, a vertical antenna approximately six feet in length is required for each equipment.

The control box for the Transmitting Equipment and the controlled circuits for the Receiving Equipment are not supplied and are the subject of other Handbooks.

4. WEIGHTS OF CABLES.

Description	Wgt. per foot
Control Cable for R-32/ARW-2, R-33/ARW-2X, T-24/ARW-3	.3 lb
Power Cable for R-32/ARW-2, R-33/ARW-2X, T-24/ARW-3	.15 lb
Power Cable for AM-10/ARW-3	.3 lb
Antenna Cable for all units	.1 lb

SECTION II
INSTALLATION AND ADJUSTMENT

1. GENERAL.

The major units are mounted on shock-proof mountings which are permanently attached to the aircraft structure at the time of installation. Connections to the units are made with flexible, shielded, rubber or vinyl covered cables with connector plugs.

In order to obtain adequate space for removal of the plugs, covers, and units for servicing, and to permit the units to rock freely on their shock mountings without striking other objects, the minimum clearances indicated on the dimensional drawings must be provided.

2. LOCATION OF UNITS.

a. RADIO RECEIVER R-32/ARW-2 OR RADIO RECEIVER R-33/ARW-2X.—No manipulation or adjustment of the receiver is required for operation, except operation of the POWER switch to start the equipment. For initial installation adjustments however, access to the front panel controls must be provided.

b. RADIO TRANSMITTER T-24/ARW-3.—No manipulation or adjustment of the transmitter is required for operation, except operation of the FILAMENT and PLATE switches to start the equipment. For initial installation adjustments however, access to the front panel controls must be provided.

c. AMPLIFIER UNIT AM-10/ARW-3.—No manipulation or adjustment of the Amplifier is required during normal operation, except operation of the FILAMENT and PLATE switches to start the equipment. For initial installation adjustments however, access to the front panel controls must be provided.

3. INSTALLATION OF R-32/ARW-2, R-33/ARW-2X OR T-24/ARW-3.

a. SHOCK MOUNTING *MT-52/UR.—All of the equipments listed above use the same size mounting rack and are installed in exactly the same manner. The mounting racks are provided with four shock mountings each, which are to be secured to the aircraft structure. To mount the units proceed as follows:

(1) Drill holes for the shock mounts in the supporting surface as shown in the details of figure 4.

(2) Fasten the shock mounts to the supporting surface with screws, nuts and suitable locking devices. Ground straps will be found attached to each mounting. It is extremely important to have these ground straps make a good electrical connection with the metal structure of the aircraft.

This may be accomplished by looping the grounding strap under the shock mounting foot and bolting it to the structure of the aircraft under the mounting foot making sure that no paint or other insulating material interferes with a good ground connection. When fastened in the shock mounting rack, the unit will be effectively grounded through the rear mounting pins, the thumb-nut locking devices of the mounting base, and the ground straps.

b. CABLES.—Three cables are required for a normal installation of Radio Receivers R-32/ARW-2, R-33/ARW-2X or Radio Transmitter T-24/ARW-3. These are (1) remote control cable, (2) power cable, (3) antenna cable. All cables are supplied in bulk. Cable connectors for the radio set end of the cables are supplied with the radio equipment.

The free end of the remote control cable must be wired upon installation to a cable connector for the control unit (not supplied). Instructions for making these connections will be issued separately by the Navy Department, Bureau of Aeronautics. The cable connections are shown on figure 10 for the receiver and on figure 11 for the transmitter.

The power cable must be connected to the aircraft's electrical system at the most convenient junction box. Instructions for making these connections will be issued separately by the Navy Department, Bureau of Aeronautics. The cable connections are shown on figure 10 for the receiver and on figure 11 for the transmitter.

The antenna cable must be connected to the vertical radiator furnished separately according to

instructions issued separately by the Navy Department, Bureau of Aeronautics.

4. INSTALLATION OF AMPLIFIER UNIT AM-10/ARW-3.

a. SHOCK MOUNTING *MT-53/UR.—The instructions found in paragraph 3a apply here except that the detailed mounting dimensions will be found on figure 5.

b. CABLES.—Three cables are required to be used with the Amplifier Unit AM-10/ARW-3. (See fig. 11.) All cables are supplied in bulk. Cable connectors for the radio set end of each cable are supplied with the radio equipment. The installation of one, the antenna cable, has already been covered in paragraph 3b. A second r-f cable is required to conduct r-f energy from Radio Transmitter T-24/ARW-3 to Amplifier Unit AM-10/ARW-3. The instructions on figure 12 should be followed in assembling this cable.

The power cable must be connected to a power source of 115 volts 800-2400 cycles alternating current according to instructions issued separately by the Navy Department, Bureau of Aeronautics. The cable connections are shown on figure 11.

5. CONNECTING CABLES TO UNITS.

CAUTION

BEFORE PLUGGING ANY CABLES INTO THE UNITS MAKE SURE THAT ALL POWER, FILAMENT AND PLATE SWITCHES ARE TURNED *OFF*.

6. ADJUSTMENTS.

WARNING

OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES WHICH ARE DANGEROUS TO LIFE. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE SAFETY REGULATIONS. DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE THE EQUIPMENT WITH HIGH VOLTAGE SUPPLY ON. DO NOT DEPEND UPON DOOR SWITCHES OR INTERLOCKS FOR PROTECTION BUT ALWAYS SHUT DOWN MOTOR GENERATORS OR OTHER POWER EQUIPMENT. UNDER CERTAIN CONDITIONS DANGEROUS POTENTIALS MAY EXIST IN CIRCUITS WITH POWER CONTROLS IN THE OFF POSITION DUE TO CHARGES RETAINED BY CAPACITORS, ETC. TO AVOID CASUALTIES ALWAYS DISCHARGE AND GROUND CIRCUITS PRIOR TO TOUCHING THEM.

THE ATTENTION OF OFFICERS AND OPERATING PERSONNEL IS DIRECTED TO BUREAU OF ENGINEERING CIRCULAR LETTER NO. 5a OF 3 OCTOBER 1934, OR SUBSEQUENT REVISIONS THEREOF ON THE SUBJECT OF RADIO—"SAFETY PRECAUTIONS TO BE OBSERVED."

a. RADIO RECEIVERS R-32/ARW-2 AND R-33/ARW-2X.—The only adjustment needed upon installation of Radio Receivers R-32/ARW-2 or R-33/ARW-2X is that of the pre-selector controls. (See figs. 6 and 7.) The equipment required is one Test Meter Unit Type 1623 and a small screw driver. The following procedure should be followed.

(1) Connect the power cable to the receiver unit.

(2) Throw the POWER switch ON and allow several minutes for the receiver to warm up.

(3) Plug the test meter unit test cable into the TEST METER receptacle on the receiver front panel. (See figs. 6 and 7.) Turn the selector switch on the test meter unit to the 1st LIMiter position.

(4) Turn the SUPPRESSOR control on the panel of the Radio Receiver (see figs. 6 and 7) to its most sensitive (fully counter-clockwise) position.

(5) The test meter should show a reading of at least 100 microamperes. IF IT DOES NOT SHOW ANY READING, MAKE NO FURTHER ADJUSTMENTS. Check to see if the dynamotor is running and if the test meter unit shows normal BATTERY voltage (23-29 volts for the R-32/ARW-2 and 11.5-14.5 volts for the R-33/ARW-2X) and PLATE voltage (250 volts).

(6) If the test meter unit shows a reading in the 1st LIMiter position, connect the antenna cable to the receiver. The test meter reading will "flicker" slightly upward or downward when the pre-selector is tuned through resonance, depending upon the strength and character of the noise picked

up by the antenna. Adjust the PRE-SELECTOR screw driver adjustments to the point where the "flicker" occurs.

(7) The SUPPRESSOR control must be reset to a position determined by the type of aircraft and the operating conditions of the equipment. Consult the maintenance officer for this information.

b. RADIO TRANSMITTER T-24/ARW-3.—The P.A. TUNING and ANTenna TUNING (see fig. 8) controls must be adjusted upon installation in the following manner.

(1) Place the FILAMENT and PLATE power switches in the OFF position, and the CONSTANT CARRIER-KEYED CARRIER switch in the KEYED CARRIER position. (See fig. 8.)

(2) Connect the power cable *ONLY;* disconnect the antenna and control cables temporarily.

(3) Throw the FILAMENT switch ON and allow several minutes for the vacuum tubes to warm up. The green pilot should be illuminated.

(4) Throw the PLATE switch ON. The red pilot should light, and the dynamotor should be heard to start.

(5) Place the meter switch in position 5 (P.A. CATHODE) and throw the KEYED CARRIER—CONSTANT CARRIER switch to the CONSTANT CARRIER position.

(6) Adjust the P.A. TUNING control for *minimum* meter reading. The p.a. cathode current should "dip" from at least 150 ma (3.0 on the meter scale), to not more than 50 ma (1.0 on the meter scale).

(7) Connect the antenna cable and readjust the P.A. TUNING control for minimum meter reading. If this *minimum* meter reading is not now between 95 and 105 ma (between 1.9 and 2.1 on the meter scale), change the setting of the ANTenna TUNING control slightly and again check the P.A. TUNING adjustment for *minimum* meter reading. Continue this process until the P.A. CATHODE current is 100 ma (2.0 on the meter scale) at the same time that the P.A. TUNING is adjusted for minimum meter reading.

(8) Throw the KEYED CARRIER—CONSTANT CARRIER switch to the KEYED CARRIER position.

(9) Connect the control cable and the unit is ready for operation.

c. AMPLIFIER UNIT AM-10/ARW-3.—Paragraph 6b has described the method of adjusting Radio Transmitter T-24/ARW-3 when it is used alone to feed an antenna directly. When it is used to drive an Amplifier Unit AM-10/ARW-3, the procedure is somewhat different and is described below together with the procedure for adjusting the amplifier.

(1) Execute the steps outlined in paragraphs 6b(1) to 6b(6) inclusive.

(2) Throw the KEYED CARRIER—CONSTANT CARRIER switch to the KEYED CARRIER position.

(3) With the FILAMENT and PLATE switches on Amplifier Unit AM-10/ARW-3 in the OFF position (see fig. 9) connect the amplifier power cable and the r-f cable from Radio Transmitter T-24/ARW-3.

(4) Throw the amplifier FILAMENT switch ON and allow the amplifier to warm up for several minutes. The FILAMENT pilot should light.

(5) Throw the KEYED CARRIER—CONSTANT CARRIER switch on the transmitter unit to the CONSTANT CARRIER position. With the meter switch in position 5 (P.A. CATHODE), adjust the P.A. TUNING control for minimum meter reading. Connect the r-f output cable leading to the amplifier unit and readjust the P.A. TUNING control for minimum meter reading.

(6) With the amplifier meter switch in the GRID CURRENT position, adjust the GRID TUNING control for maximum meter reading. This reading should be approximately 16 ma with no plate voltage applied to the amplifier. If it is more or less than this value, change the setting of the ANTenna TUNING control on Radio Transmitter T-24/ARW-3 slightly and retune the P.A. TUNING control on the transmitter for minimum P.A. CATHODE current. Continue this process until the desired grid current in the amplifier is obtained. At this point the P.A. CATHODE current on the transmitter should be approximately 60 ma (approximately 1.2 on the meter).

(7) Place the TUNE-OPERATE switch (on Amplifier Unit AM-10/ARW-3) in the TUNE position and throw the PLATE switch ON. The PLATE pilot should light. With the meter switch in the PLATE CURRENT position, adjust the PLATE TUNING control for minimum meter reading. The plate current should dip from about 120 ma to approximately 80 ma. For this adjustment the ANTENNA LOADING should be at minimum (control turned counter-clockwise).

(8) Connect the antenna cable to the amplifier and increase the ANTENNA LOADING by turning the control clockwise until the plate current rises to about 110 ma. Check the PLATE TUNING for minimum plate current.

(9) Recheck the GRID TUNING for proper adjustment by adjusting for *maximum* meter reading with the meter switch in the GRID CURRENT position. The grid current with the amplifier plate voltage applied should be between 12 and 15 ma. If necessary, readjust the ANTenna TUNING and P.A. TUNING controls on Radio Transmitter T-24/ARW-3 as described in paragraph 6b to obtain this condition.

(10) Throw the TUNE-OPERATE switch to OPERATE, the meter switch to PLATE CURRENT, and carefully adjust the PLATE TUNING control for minimum PLATE CURRENT. If this current is not between 260 and 280 ma, readjust the ANTENNA LOADING control to bring it to the desired value. The grid current should still be between 12-15 ma.

(11) Throw the KEYED CARRIER—CONSTANT CARRIER switch on the transmitter to the KEYED CARRIER position.

(12) Connect the control cable to the transmitter unit and the equipment is ready for operation.

7. STOPPING THE EQUIPMENT.

In order to stop Radio Receivers R-32/ARW-2 or R-33/ARW-2X, throw the POWER switch OFF. In order to stop Radio Transmitter T-24/ARW-3 or Amplifier Unit AM-10/ARW-3, first throw the PLATE switch OFF and then throw the FILAMENT switch OFF.

SECTION III
OPERATION

WARNING

OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES WHICH ARE DANGEROUS TO LIFE. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE SAFETY REGULATIONS. DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE THE EQUIPMENT WITH HIGH VOLTAGE SUPPLY ON. DO NOT DEPEND UPON DOOR SWITCHES OR INTERLOCKS FOR PROTECTION BUT ALWAYS SHUT DOWN MOTOR GENERATORS OR OTHER POWER EQUIPMENT. UNDER CERTAIN CONDITIONS DANGEROUS POTENTIALS MAY EXIST IN CIRCUITS WITH POWER CONTROLS IN THE OFF POSITION DUE TO CHARGES RETAINED BY CAPACITORS, ETC. TO AVOID CASUALTIES ALWAYS DISCHARGE AND GROUND CIRCUITS PRIOR TO TOUCHING THEM.

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1. RADIO RECEIVERS R-32/ARW-2 OR R-33/ARW-2X.

a. STARTING THE RECEIVER.—The receiver is started by throwing the POWER switch ON. The dynamotor will be heard to start at the same time.

b. OPERATION.—There are no operational controls or adjustments on the receivers.

c. STOPPING THE RECEIVER.—The receiver is stopped by throwing the POWER switch OFF.

2. RADIO TRANSMITTER T-24/ARW-3.

a. STARTING THE TRANSMITTER.—The transmitter is started by first throwing the FILAMENT switch ON. The green pilot should light. After one minute has elapsed make sure that the KEYED CARRIER — CONSTANT CARRIER switch is in the KEYED CARRIER position and throw the PLATE switch ON. The red pilot will light and the dynamotor will be heard to start.

b. OPERATION.—Complete control of the transmitter during operation is at a remote point. There are no operational controls or adjustments on the transmitter unit.

c. STOPPING THE TRANSMITTER.—The transmitter is stopped by throwing first the PLATE switch and then the FILAMENT switch OFF.

3. AMPLIFIER UNIT AM-10/ARW-3.

a. STARTING THE AMPLIFIER.—The amplifier is started by first throwing the FILAMENT switch to ON. The FILAMENT pilot should light. After several minutes delay, make sure that the TUNE-OPERATE switch is in the TUNE position and throw the PLATE switch ON. The PLATE pilot should light. If the pilot does not go on, probably a sufficient interval of time has not elapsed between turning the FILAMENT and PLATE switches ON. A time delay relay is incorporated in the amplifier unit to prevent application of plate voltage before a sufficient warm-up period has elapsed. As a last step, throw the TUNE-OPERATE switch to OPERATE. *BUT NOT UNTIL THE PLATE PILOT LIGHT IS ON!*

b. OPERATION.—There are no operational controls or adjustments on the amplifier unit.

c. STOPPING THE AMPLIFIER.—Throw the TUNE-OPERATE switch to TUNE, the PLATE switch to OFF, and the FILAMENT switch to OFF in that order.

SECTION IV
SUPPLEMENTARY DATA

No additional supplementary data is required beyond that already included in other sections of this Handbook.

SECTION V
EMERGENCY OPERATION AND REPAIR

1. GENERAL.

Although circuit adjustments cannot usually be made while the equipment is installed in a plane, a few simple checks can sometimes be made as outlined below, which may be the means of restoring service without removing the equipment from the plane.

2. FUSES.

Failure of equipment to operate may be the result of an "open" fuse. A quick check can be made by removing the various fuses for inspection.

a. Radio Receivers R-32/ARW-2 and R-33/ARW-2X have only one fuse in the circuit. This fuse and a spare to replace it with in an emergency are located on the front panel of the receiver as shown on figures 6 and 7. The fuse is in the primary power circuit, and an open fuse would prevent power from reaching either the filaments or dynamotor.

b. Radio Transmitter T-24/ARW-3 is protected by two fuses, one of 10 amperes rating in the primary power circuit and one of .25 ampere rating in the dynamotor output circuit. They are located on the front panel of the transmitter as shown on figure 8. A spare fuse of each type is also located on the front panel.

c. Amplifier Unit AM-10/ARW-3 has two fuses in the circuit and both are located, along with a spare for each, on the front panel. One, a 15 ampere fuse, protects the primary circuits and the other, a 2 ampere fuse, protects the blower circuit. Both are in series with the incoming 115 volt, 800-2400 cycle a-c line. (See fig. 9.)

3. TUBES.

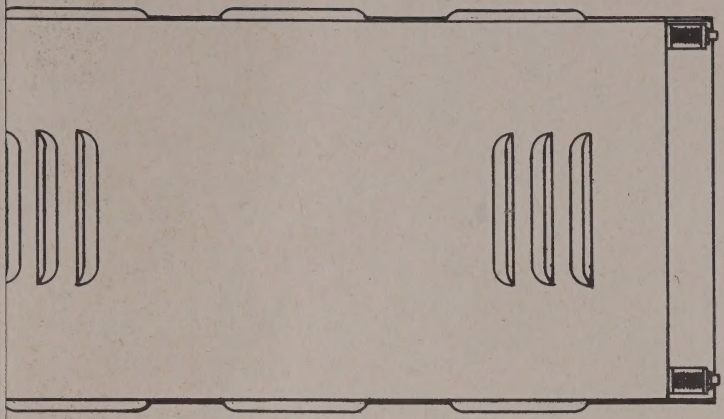
In case of failure of the equipment to operate, if the trouble cannot be traced to an open fuse it may be advisable to inspect the tubes in the unit in question for breakage or burn-out. To do this it is necessary to remove the unit from its shock mounting base and dust cover as follows:

a. Disconnect all cables connected to the unit and inspect visually for breaks; emergency repairs may be possible.

b. Loosen the thumb nut locking devices on the front of the shock mounting base until the entire unit can be slid out of the base.

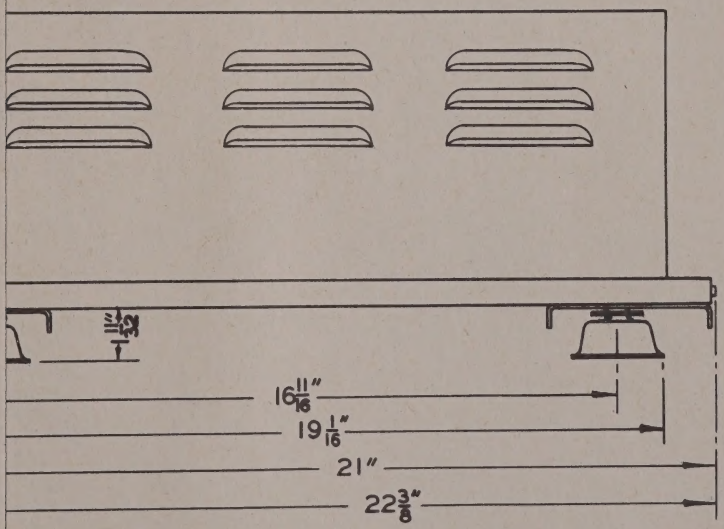
c. Loosen the locking fastener in the center of the back of the dust cover, remove the three cover fastening screws at the top and sides near the front panel and slide the dust cover off the unit.

Inspect visually for any broken tubes, and by feeling the various tubes for warmth, determine if any indicate apparent burn-out because of their coolness. Replace such tubes with new ones and replace the unit in the dust cover and shock mounting for trial.



'E UNIT FROM MOUNTING BASE IN THIS DIRECTION

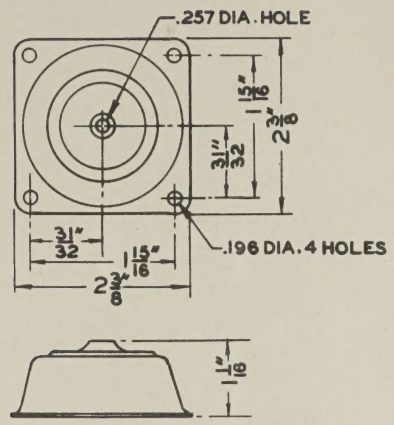
V 6" CLEARANCE FOR
OVAL OF CABLE.



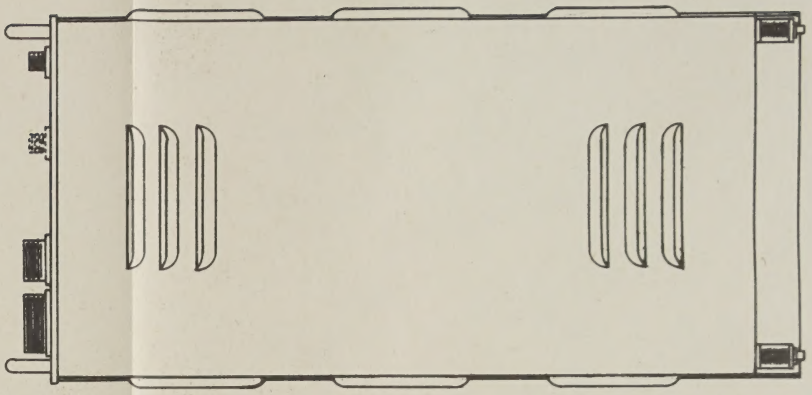
E - TO REMOVE DUST COVER ALL CABLES MUST BE DISCONNECTED AND UNIT REMOVED FROM MOUNTING BASE.

.6 LBS
.9 LBS

Figure 4 — Outline Dimensions of R-32/ARW-2, R-33/ARW-2X, and T-24/ARW-3 Showing Cable Clearances and Mounting Details

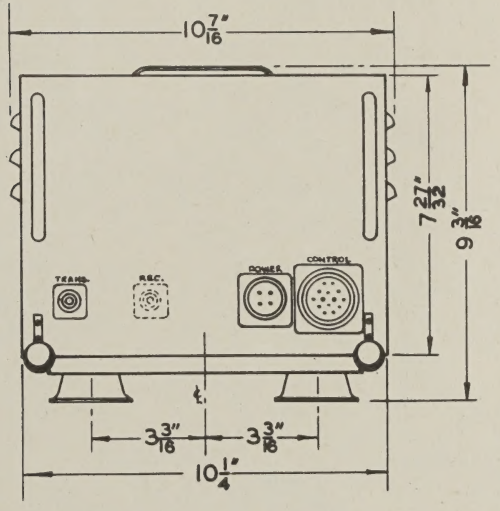


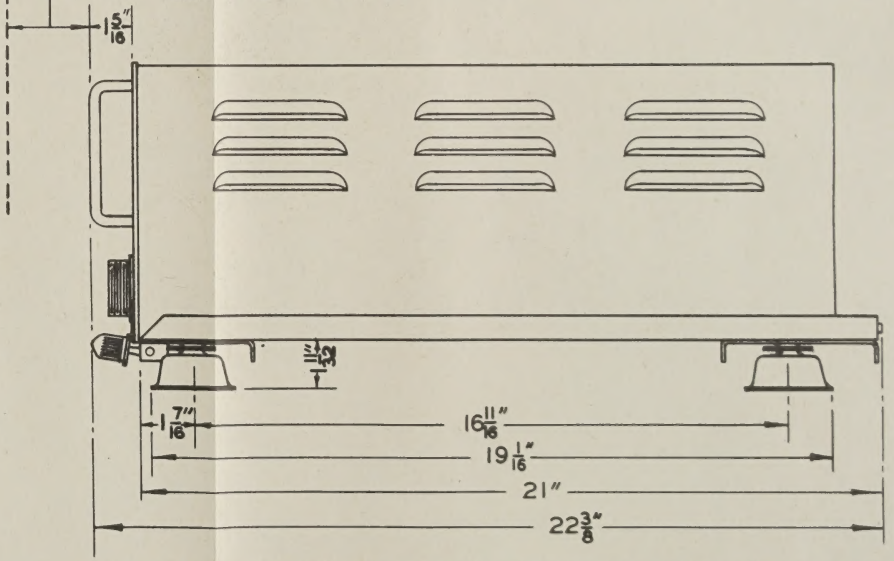
ANTI-VIBRATION MOUNTING FOOT



REMOVE UNIT FROM MOUNTING BASE IN THIS DIRECTION

ALLOW 6" CLEARANCE FOR REMOVAL OF CABLE.





ALLOW 1" CLEARANCE ALL AROUND FOR VIBRATION.

NOTE - TO REMOVE DUST COVER ALL CABLES MUST BE DISCONNECTED AND UNIT REMOVED FROM MOUNTING BASE.

WEIGHT- RECEIVER UNIT WITH MOUNTING BASE--48.6 LBS
MOUNTING BASE----3.9 LBS

TRANSMITTER UNIT WITH MOUNTING BASE-----34.6 LBS
MOUNTING BASE 3.9 LBS

Figure 4—Outline Dimensions of R-32/ARW-2, R-33/ARW-2X, and T-24/ARW-3 Showing Cable Clearances and Mounting Details

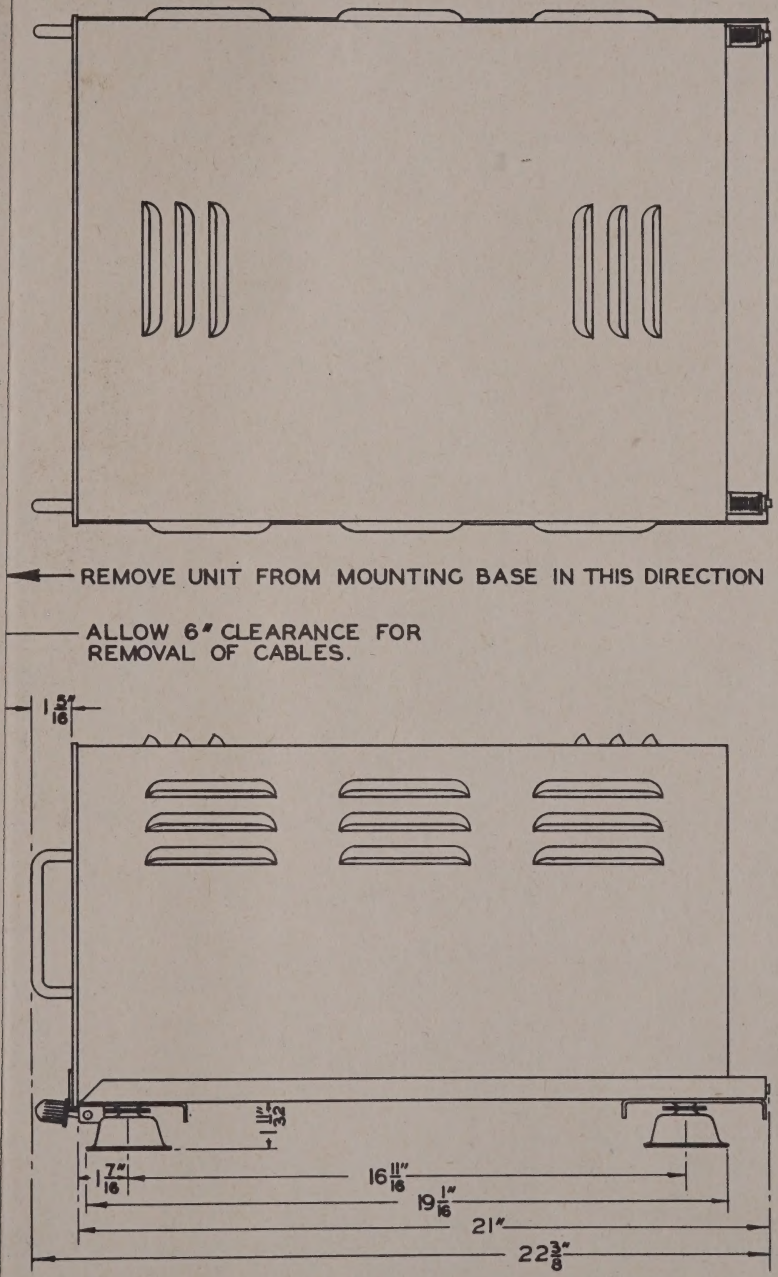
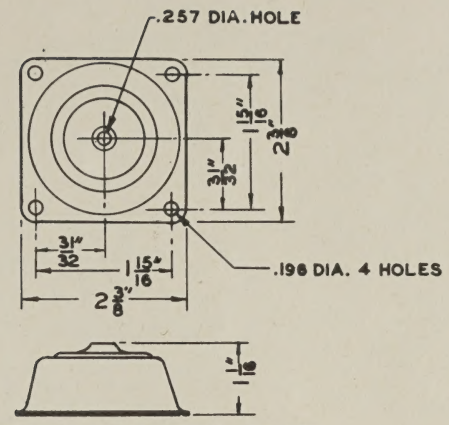


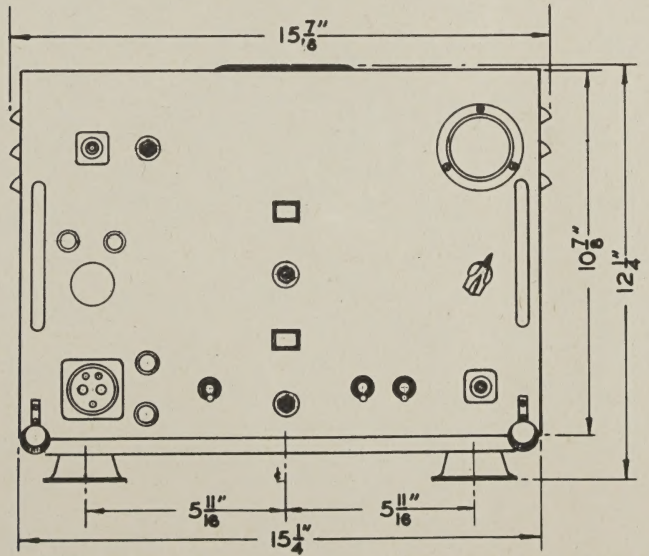
Figure 5—Outline Dimensions of AM-10/ARW-3 Showing Cable Clearances and Mounting Details



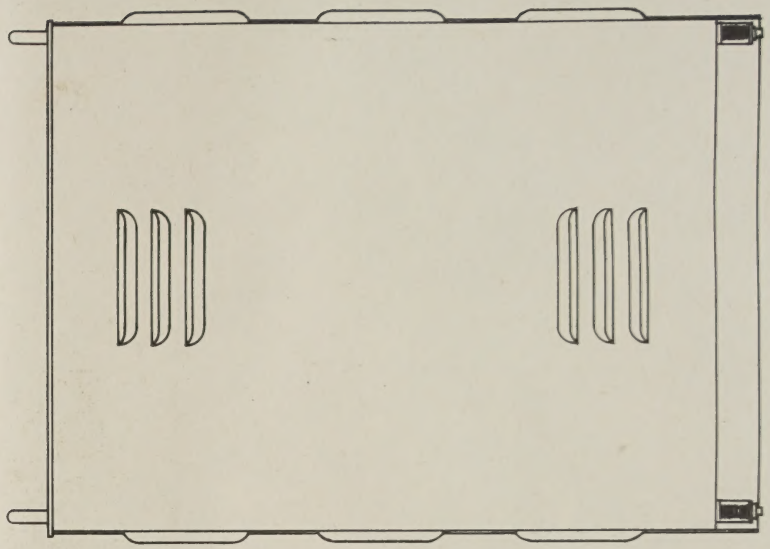
AN 7 VIBRATION MOUNTING FOOT

WEIGHT – AMPLIFIER UNIT WITH
MOUNTING BASE--- SERIAL NOS. 1-50-----81.5 LBS.
SERIAL NOS. 51-UP----65.5 LBS.
MOUNTING BASE----------4.1 LBS.

ALLOW 1" CLEARANCE ALL AROUND
FOR VIBRATION.



NOTE = TO REMOVE DUST COVER ALL CABLES MUST BE DISCONNECTED AND UNIT MUST BE REMOVED FROM MOUNTING BASE.



← REMOVE UNIT FROM MOUNTING BASE IN THIS DIRECTION

ALLOW 6" CLEARANCE FOR
REMOVAL OF CABLES.

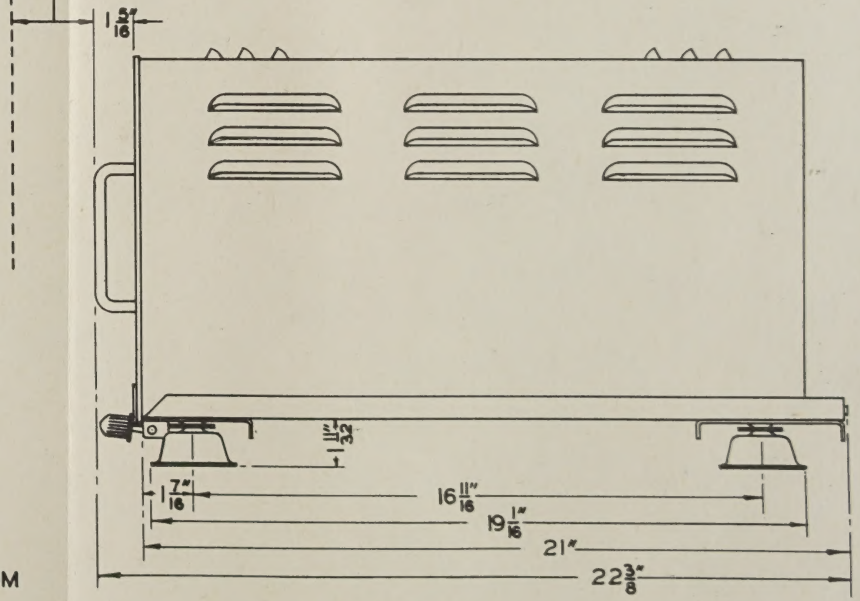


Figure 5 – Outline Dimensions of AM-10/ARW-3 Showing Cable Clearances and Mounting Details

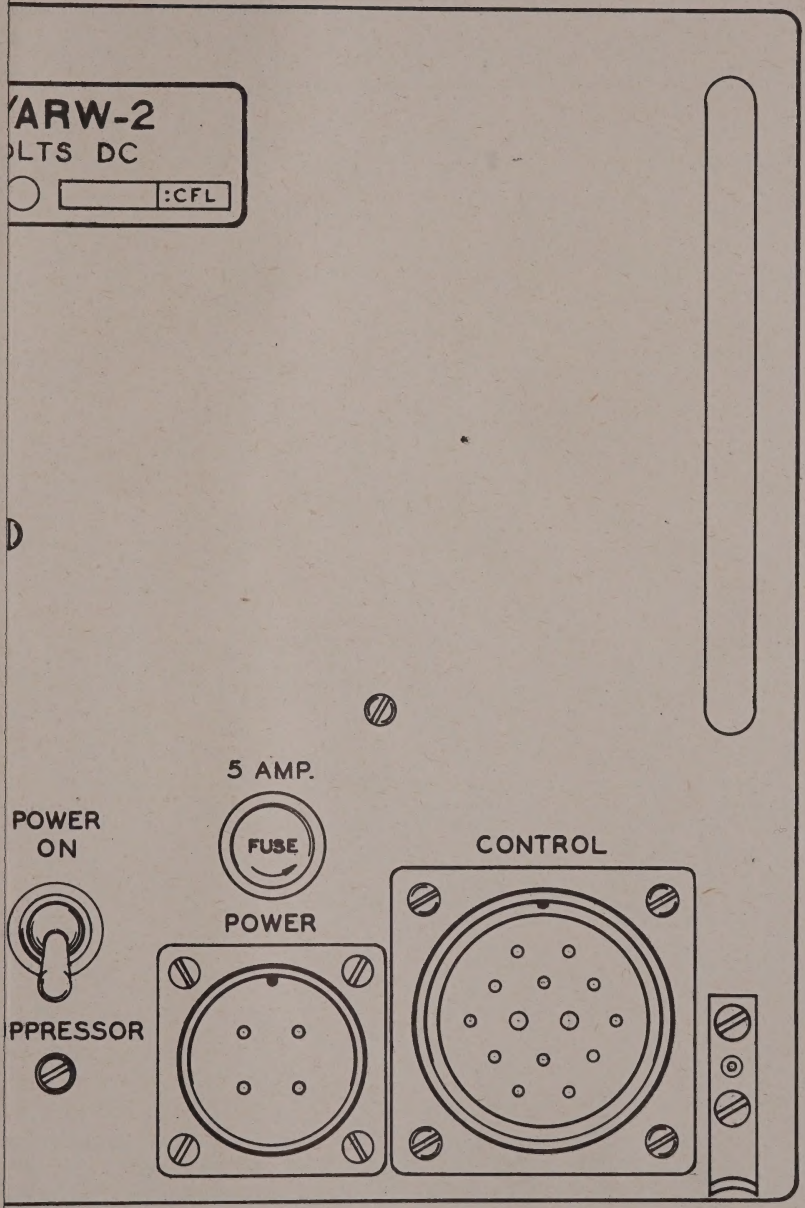


Figure 6—Front Panel R-32/ARW-2

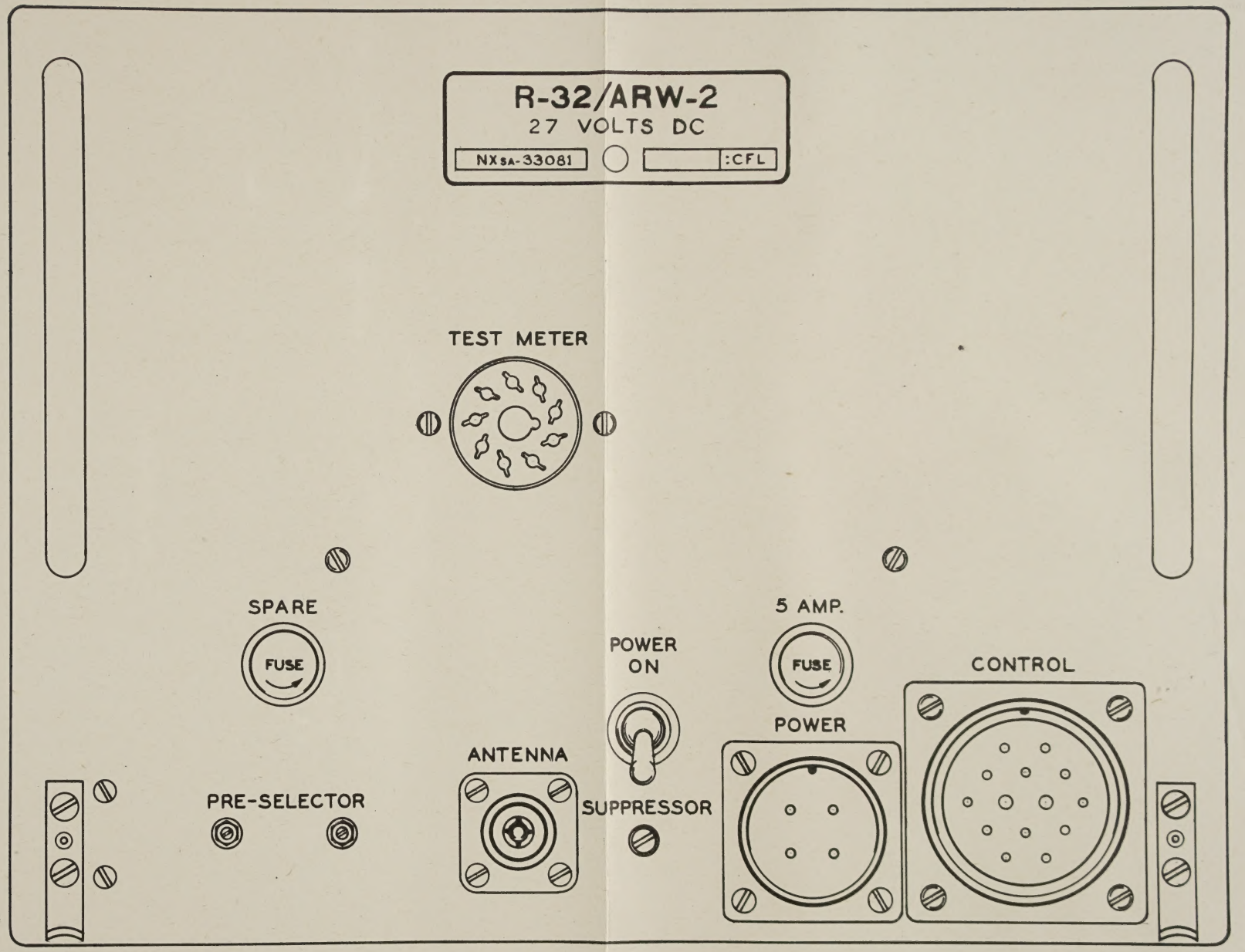


Figure 6 — Front Panel R-32/ARW-2

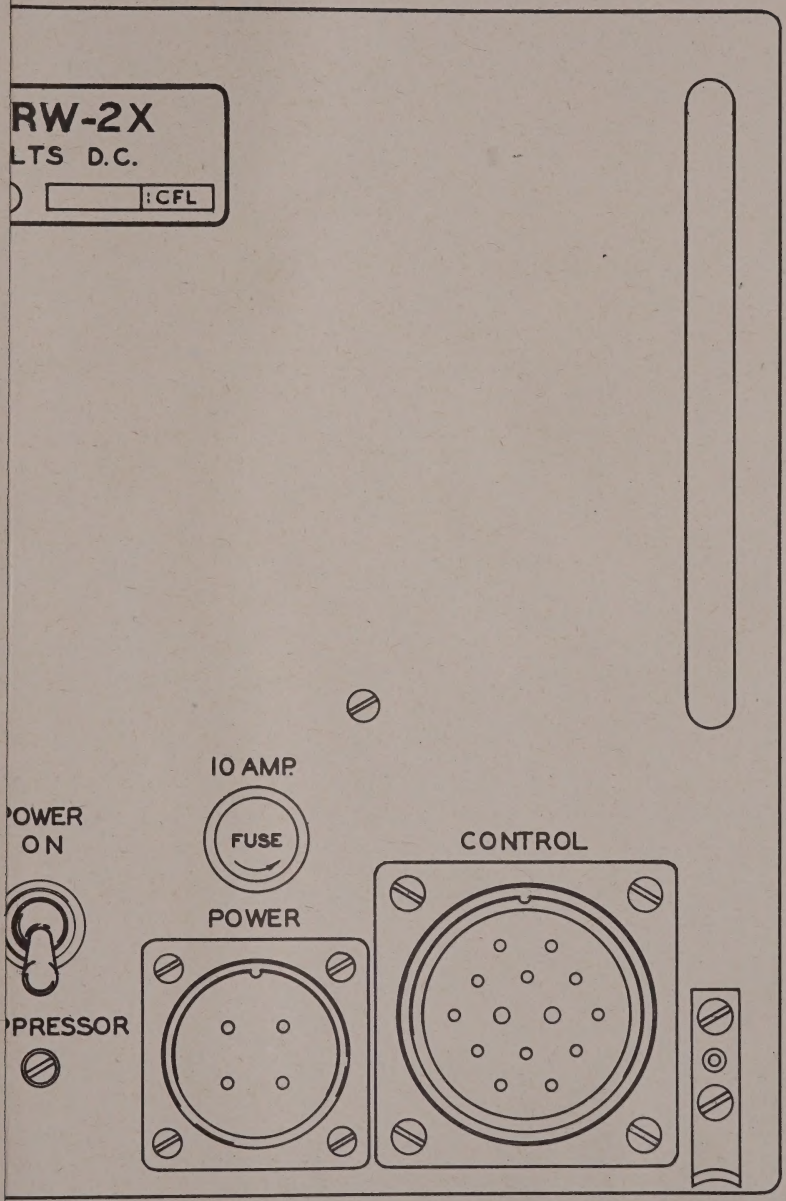


Figure 7 — Front Panel R-33/ARW-2X

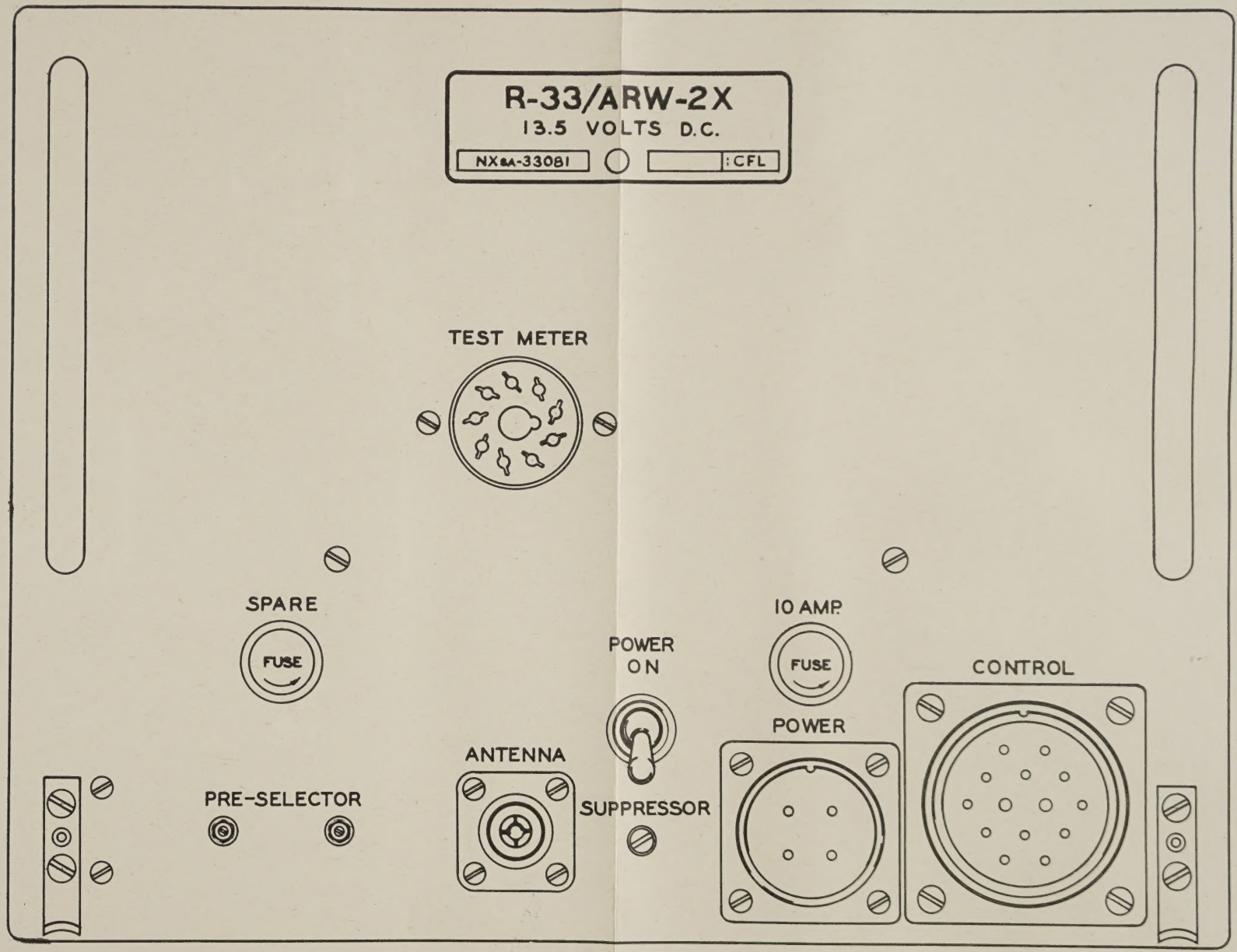


Figure 7 — Front Panel R-33/ARW-2X

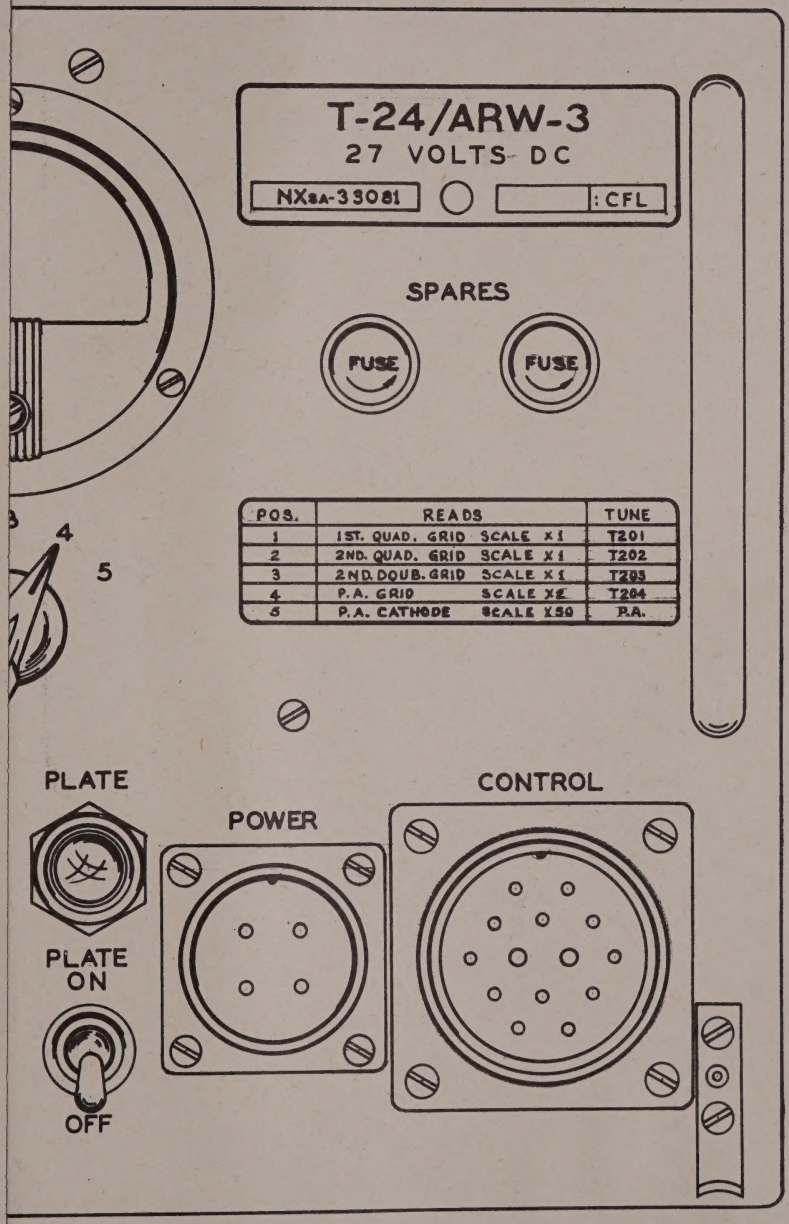


Figure 8 — Front Panel T-24/ARW-3

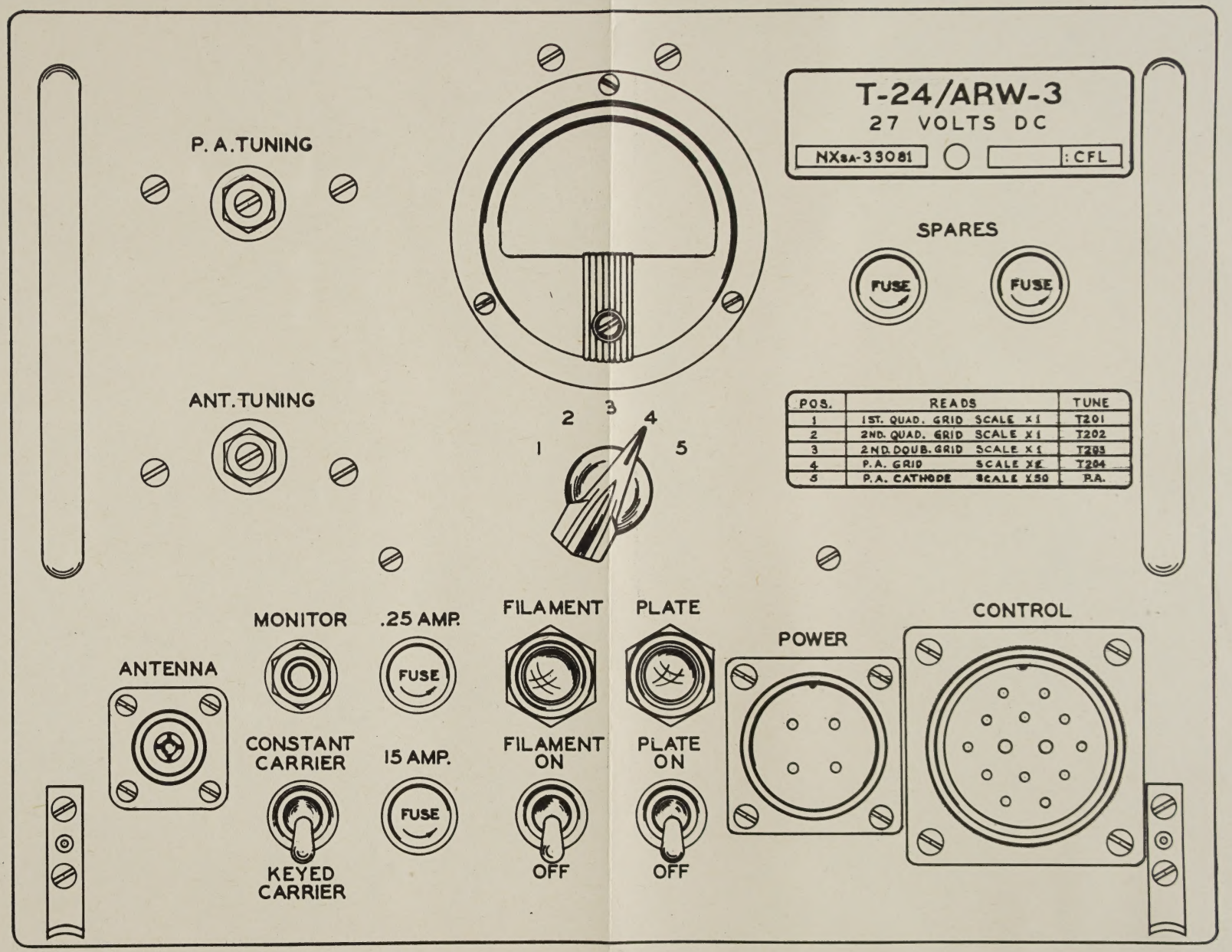


Figure 8 — Front Panel T-24/ARW-3

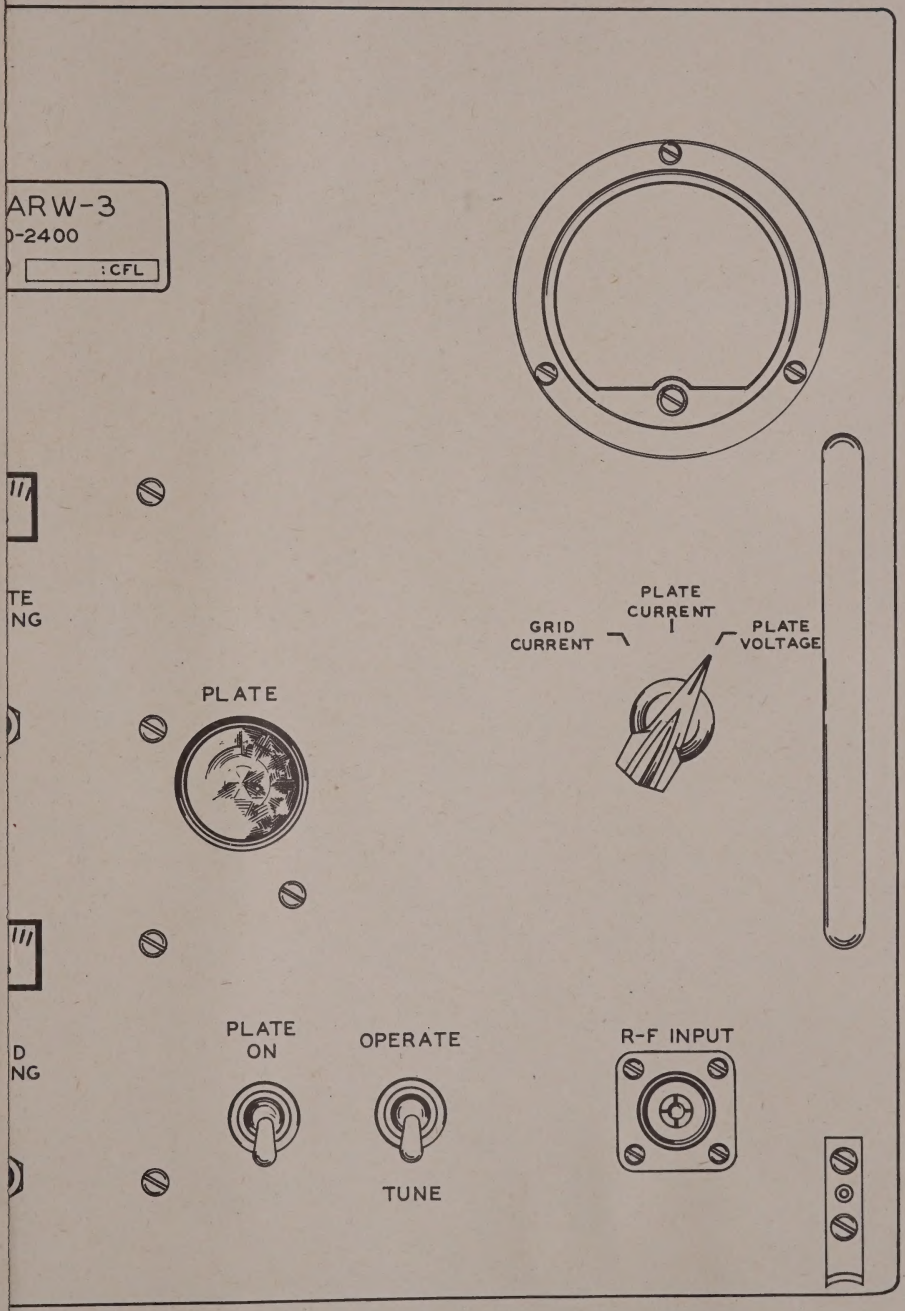


Figure 9—Front Panel AM-10/ARW-3

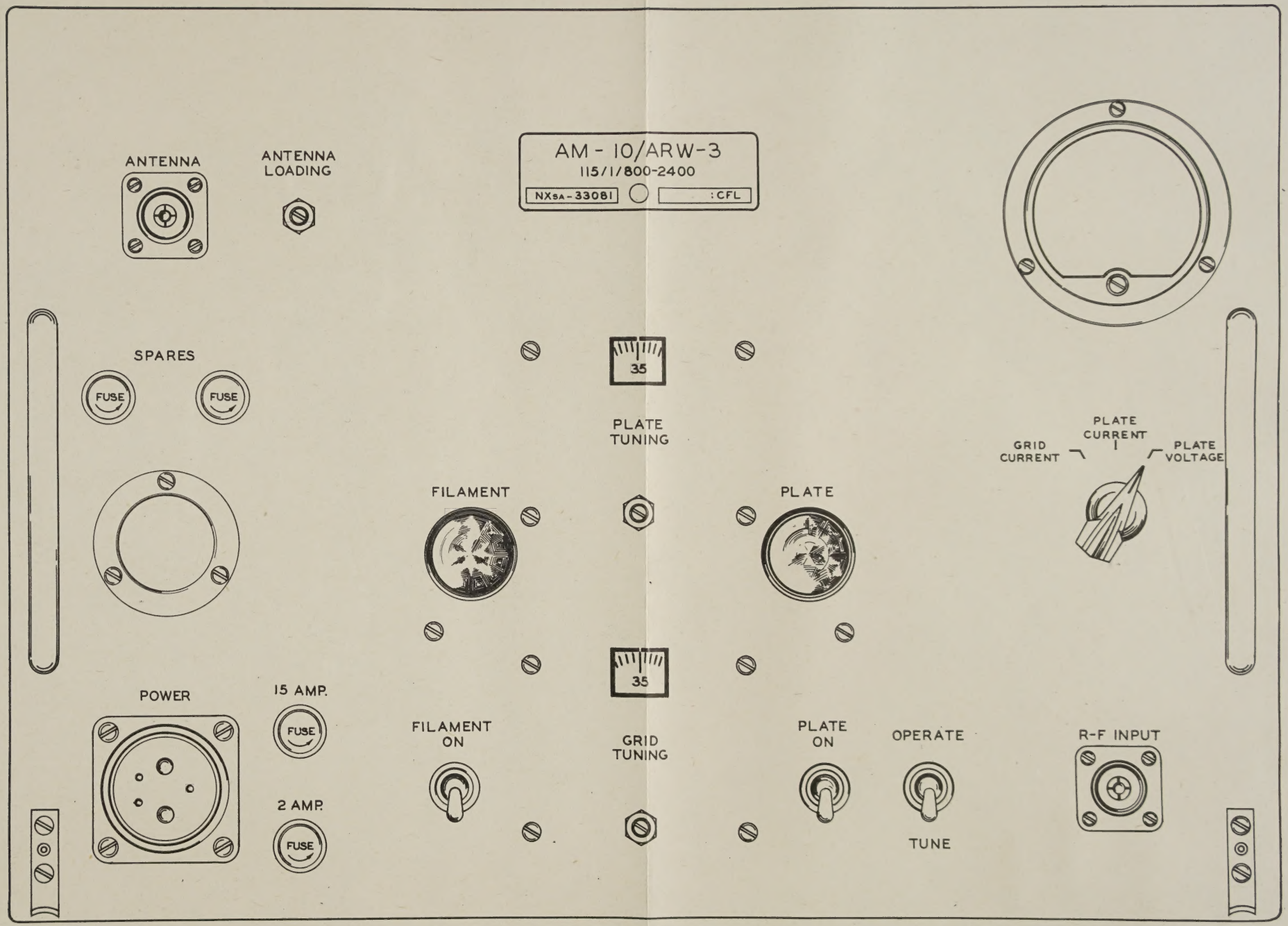
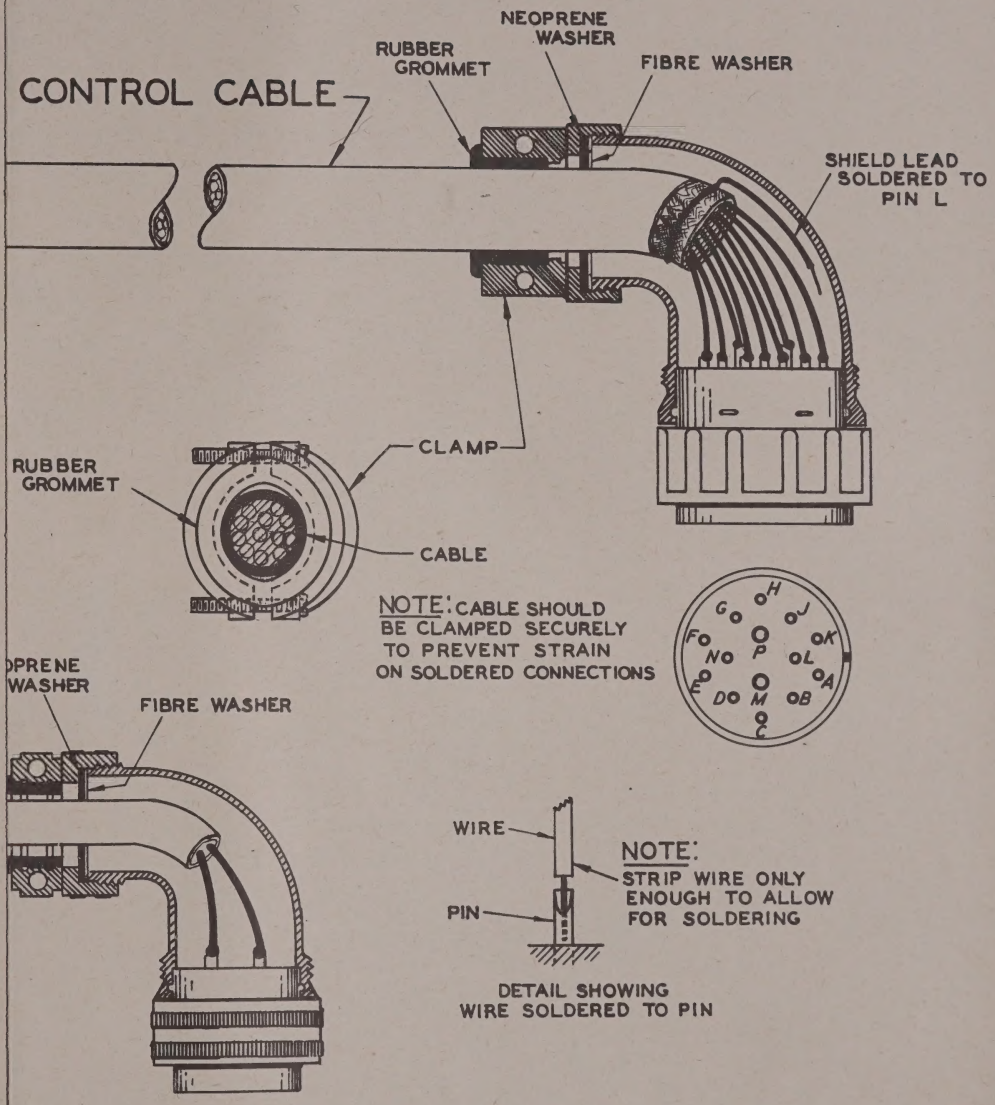


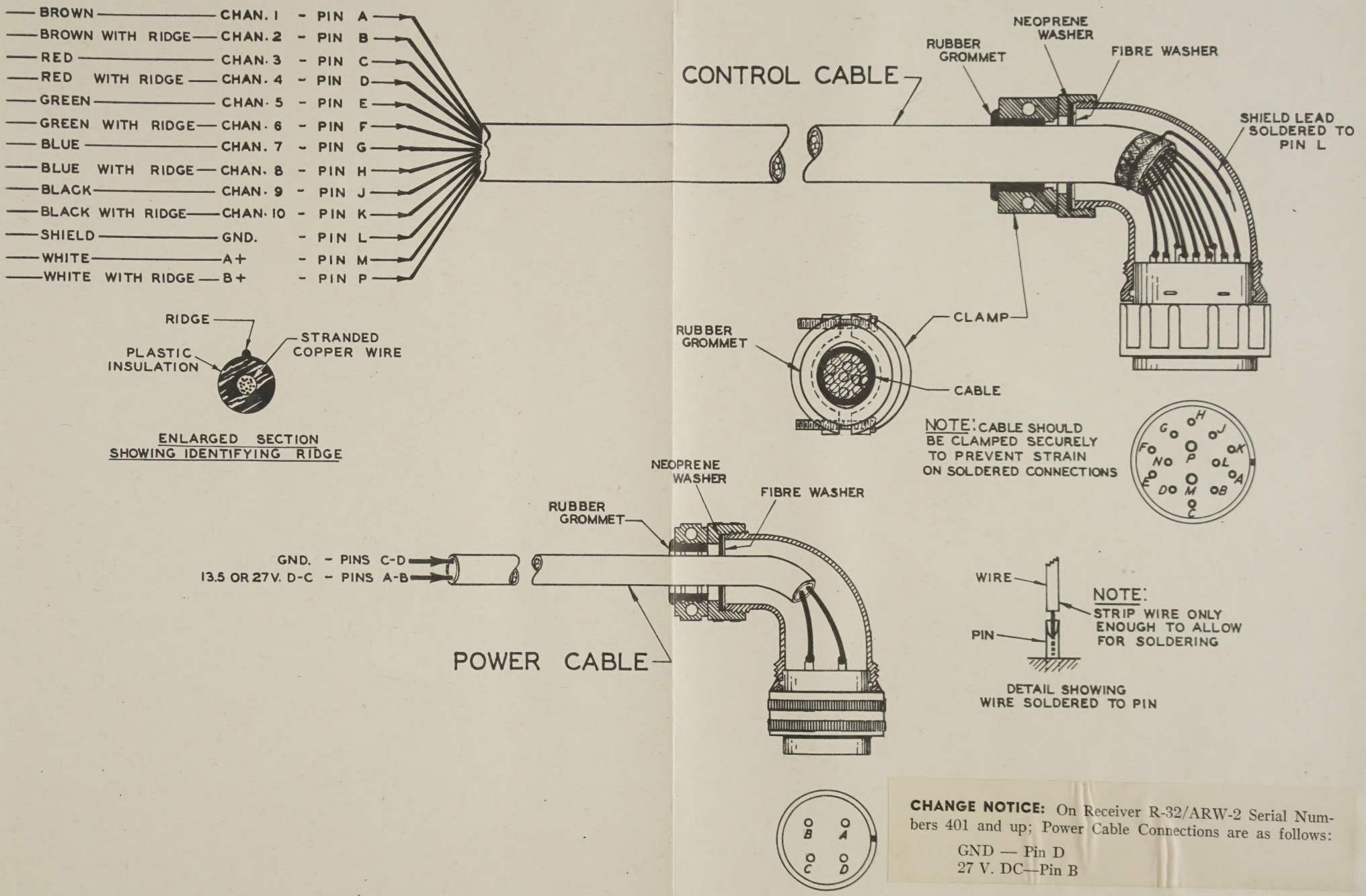
Figure 9—Front Panel AM-10/ARW-3



CHANGE NOTICE: On Receiver R-32/ARW-2 Serial Numbers 401 and up; Power Cable Connections are as follows:

GND — Pin D
27 V. DC—Pin B

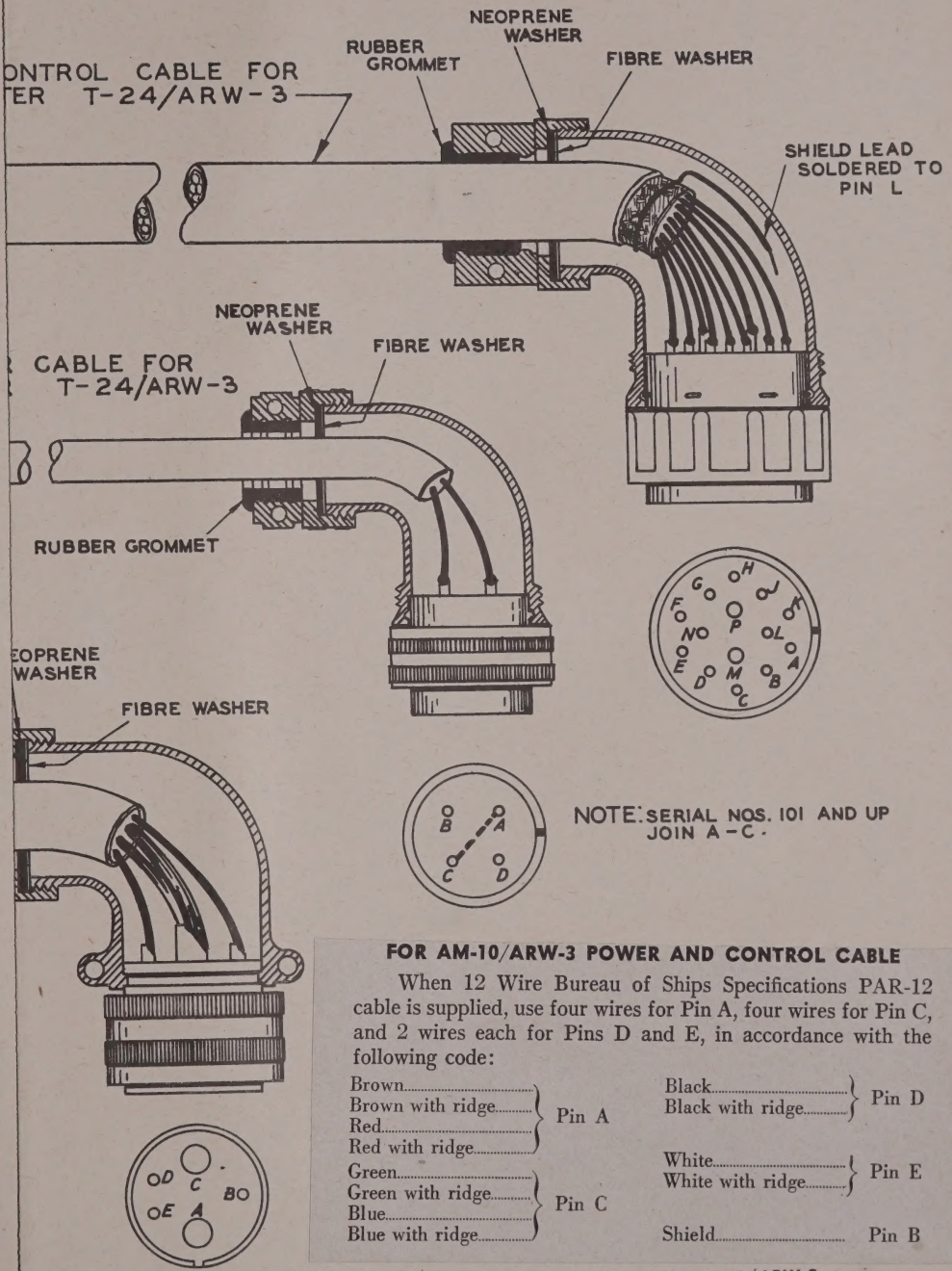
Figure 10 — Cabling Diagram for R-32/ARW-2 and R-33/ARW-2X


BROWN — CHAN. 1 - PIN A
BROWN WITH RIDGE — CHAN. 2 - PIN B
RED — CHAN. 3 - PIN C
RED WITH RIDGE — CHAN. 4 - PIN D
GREEN — CHAN. 5 - PIN E
GREEN WITH RIDGE — CHAN. 6 - PIN F
BLUE — CHAN. 7 - PIN G
BLUE WITH RIDGE — CHAN. 8 - PIN H
BLACK — CHAN. 9 - PIN J
BLACK WITH RIDGE — CHAN. 10 - PIN K
SHIELD — GND. - PIN L
WHITE — A+ - PIN M
WHITE WITH RIDGE — B+ - PIN P
RIDGE
PLASTIC INSULATION
STRANDED COPPER WIRE
ENLARGED SECTION SHOWING IDENTIFYING RIDGE
CONTROL CABLE
RUBBER GROMMET
NEOPRENE WASHER
FIBRE WASHER
SHIELD LEAD SOLDERED TO PIN L
CLAMP
RUBBER GROMMET
CABLE
NOTE: CABLE SHOULD BE CLAMPED SECURELY TO PREVENT STRAIN ON SOLDERED CONNECTIONS
NEOPRENE WASHER
FIBRE WASHER
RUBBER GROMMET
GND. - PINS C-D
13.5 OR 27V. D-C - PINS A-B
POWER CABLE
WIRE
PIN
NOTE: STRIP WIRE ONLY ENOUGH TO ALLOW FOR SOLDERING
DETAIL SHOWING WIRE SOLDERED TO PIN
B A C D

CHANGE NOTICE: On Receiver R-32/ARW-2 Serial Numbers 401 and up; Power Cable Connections are as follows:

GND — Pin D
27 V. DC—Pin B

Figure 10 — Cabling Diagram for R-32/ARW-2 and R-33/ARW-2X

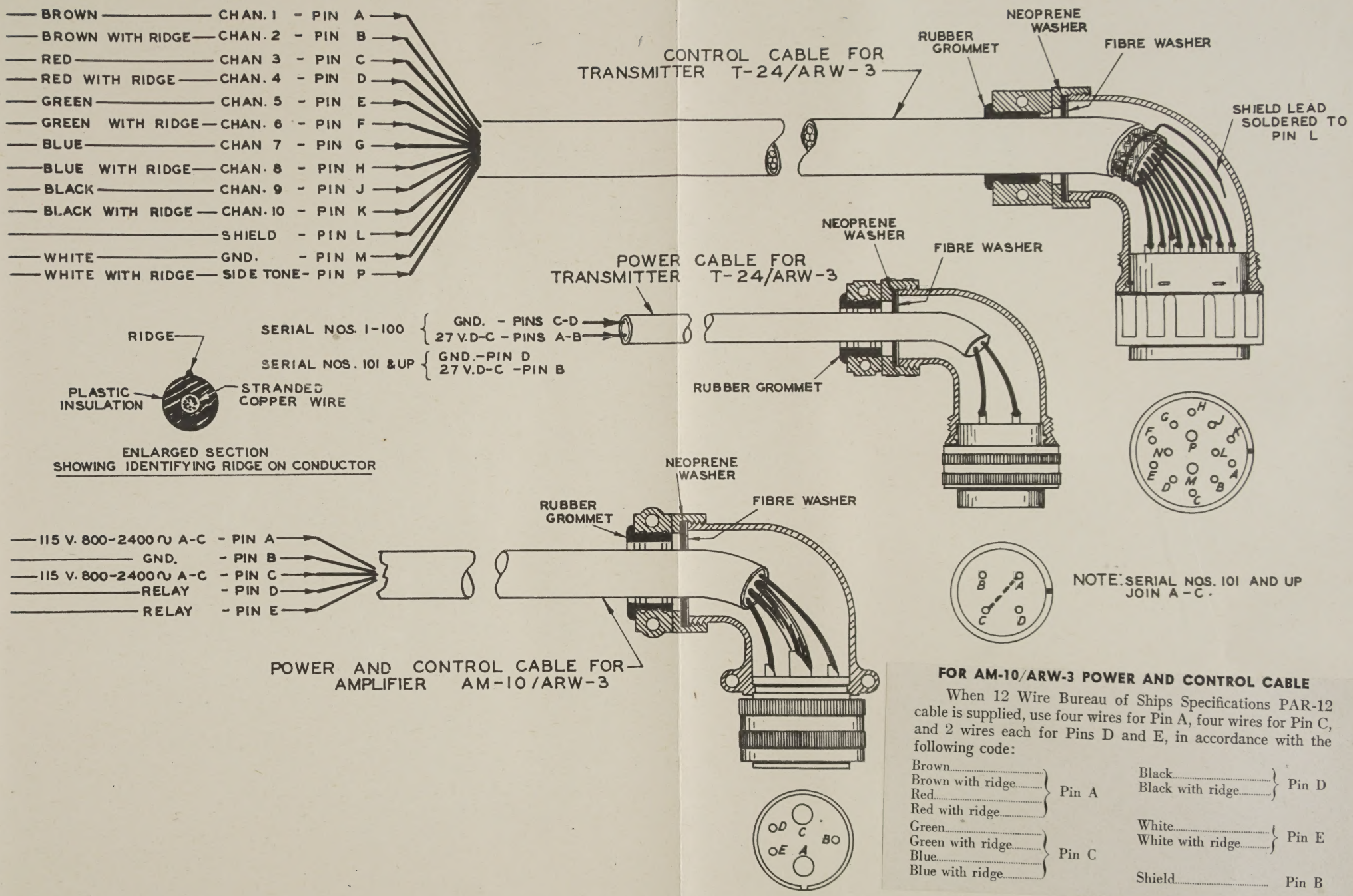


FOR AM-10/ARW-3 POWER AND CONTROL CABLE

When 12 Wire Bureau of Ships Specifications PAR-12 cable is supplied, use four wires for Pin A, four wires for Pin C, and 2 wires each for Pins D and E, in accordance with the following code:

Brown	Pin A	Black	Pin D
Brown with ridge		Black with ridge	
Red		White	Pin E
Red with ridge		White with ridge	
Green	Pin C	Shield	Pin B
Green with ridge			
Blue			
Blue with ridge			

Figure 11 — Cabling Diagram for T-24/ARW-3 and AM-10/ARW-3

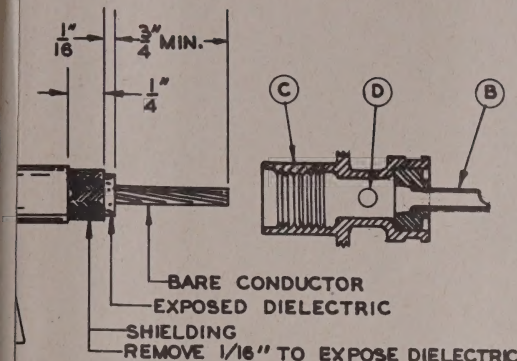

BROWN — CHAN. 1 - PIN A
BROWN WITH RIDGE — CHAN. 2 - PIN B
RED — CHAN 3 - PIN C
RED WITH RIDGE — CHAN. 4 - PIN D
GREEN — CHAN. 5 - PIN E
GREEN WITH RIDGE — CHAN. 6 - PIN F
BLUE — CHAN 7 - PIN G
BLUE WITH RIDGE — CHAN. 8 - PIN H
BLACK — CHAN. 9 - PIN J
BLACK WITH RIDGE — CHAN. 10 - PIN K
SHIELD - PIN L
WHITE — GND. - PIN M
WHITE WITH RIDGE — SIDE TONE - PIN P
CONTROL CABLE FOR TRANSMITTER T-24/ARW-3
RUBBER GROMMET
NEOPRENE WASHER
FIBRE WASHER
SHIELD LEAD SOLDERED TO PIN L
POWER CABLE FOR TRANSMITTER T-24/ARW-3
NEOPRENE WASHER
FIBRE WASHER
SERIAL NOS. 1-100 { GND. - PINS C-D; 27 V.D-C - PINS A-B
SERIAL NOS. 101 & UP { GND.-PIN D; 27 V.D-C -PIN B
RUBBER GROMMET
RIDGE
PLASTIC INSULATION
STRANDED COPPER WIRE
ENLARGED SECTION
SHOWING IDENTIFYING RIDGE ON CONDUCTOR
NEOPRENE WASHER
RUBBER GROMMET
FIBRE WASHER
115 V. 800-2400 ∿ A-C - PIN A
GND. - PIN B
115 V. 800-2400 ∿ A-C - PIN C
RELAY - PIN D
RELAY - PIN E
POWER AND CONTROL CABLE FOR AMPLIFIER AM-10/ARW-3
NOTE: SERIAL NOS. 101 AND UP JOIN A-C.

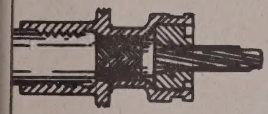
FOR AM-10/ARW-3 POWER AND CONTROL CABLE

When 12 Wire Bureau of Ships Specifications PAR-12 cable is supplied, use four wires for Pin A, four wires for Pin C, and 2 wires each for Pins D and E, in accordance with the following code:

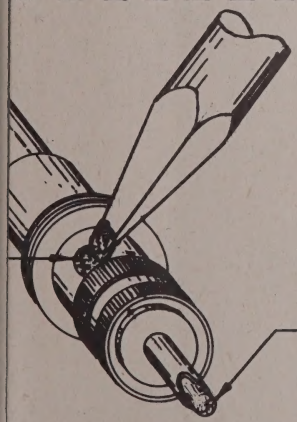
Brown Brown with ridge Red Red with ridge	Pin A	Black Black with ridge	Pin D
Green Green with ridge Blue Blue with ridge	Pin C	White White with ridge	Pin E
		Shield	Pin B

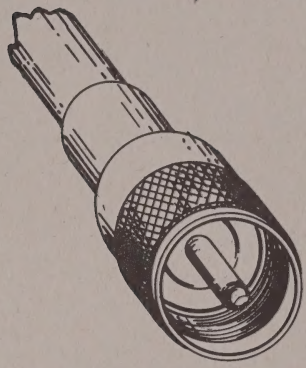
Figure 11 — Cabling Diagram for T-24/ARW-3 and AM-10/ARW-3





INTO HOLE IN CONTACT (B) AND TWIST
PER-THREADED SLEEVE (C) UNTIL SHIELDING
LES (D) IN SLEEVE.

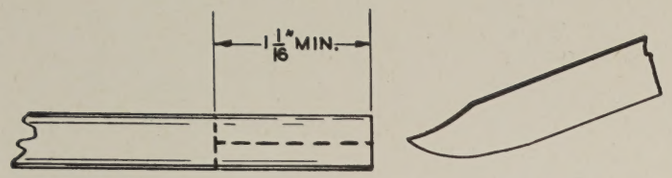




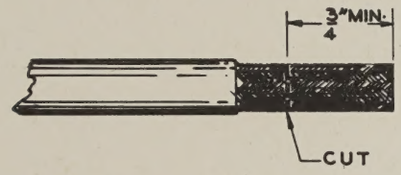
7 - SCREW COUPLING RING IN PLACE.

CAUTION: DIELECTRIC MATERIAL MELTS AT LOW TEMPERATURES AND EXTREME CAUTION MUST BE USED THROUGHOUT ALL SOLDERING OPERATIONS TO AVOID SHORT CIRCUITING CABLE TO CONNECTORS.

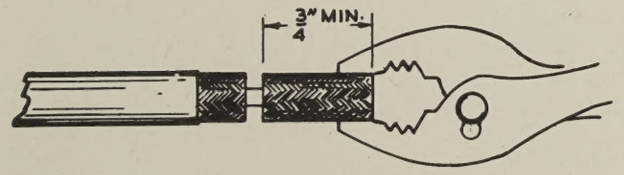
Figure 12—Fabrication of R-F Cables



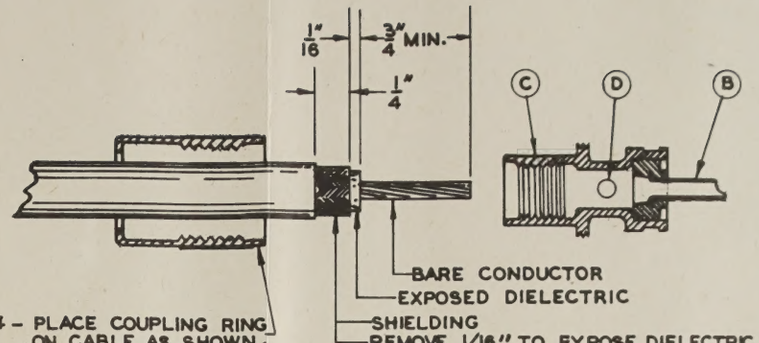
1 - MEASURE LENGTH OF BARE CONDUCTOR NECESSARY TO SOLDER TERMINAL.
ROLL CABLE UNDER A SHARP KNIFE, CUTTING COMPLETELY AROUND THE CABLE THROUGH THE OUTER JACKET TO THE METALLIC SHIELD WHICH SURROUNDS THE CONDUCTOR. A SECOND CUT IS MADE PERPENDICULAR TO THE FIRST.



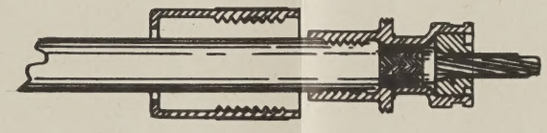
2 - THE JACKET IS REMOVED LEAVING THE BRAIDED METALLIC SHIELD EXPOSED.



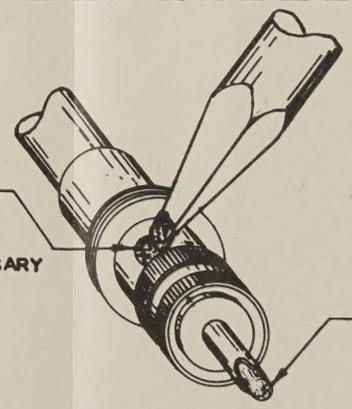
3 - ROLL THE CABLE AGAIN UNDER CUTTING EDGE OF KNIFE TO APPROXIMATELY 1/32" FROM CONDUCTOR. THE SHIELD AND COPOLENE CORE CAN BE PULLED FROM CABLE BY HAND, OR BY PLIERS.



4 - PLACE COUPLING RING ON CABLE AS SHOWN.

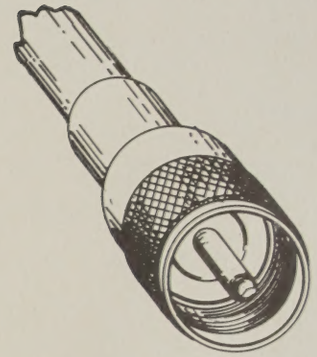


5 - INSERT CONDUCTOR INTO HOLE IN CONTACT (B) AND TWIST INSULATION INTO TAPER-THREADED SLEEVE (C) UNTIL SHIELDING PASSES SOLDER HOLES (D) IN SLEEVE.



6 - SOLDER SHIELDING WITH NEEDLEPOINT SOLDERING IRON USING NO MORE HEAT THAN NECESSARY TO EFFECT A WELL SOLDERED JOINT.

SOLDER CONDUCTOR TO TIP (B) AND REMOVE EXCESS SOLDER



7 - SCREW COUPLING RING IN PLACE.

CAUTION: DIELECTRIC MATERIAL MELTS AT LOW TEMPERATURES AND EXTREME CAUTION MUST BE USED THROUGHOUT ALL SOLDERING OPERATIONS TO AVOID SHORT CIRCUITING CABLE TO CONNECTORS.

Figure 12 — Fabrication of R-F Cables